



Transit-Oriented Development

*An Urban Design Assessment of Transit Stations
in Atlanta*

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ABSTRACT

In the late 1980s, Peter Calthorpe reintroduced and codified the idea of Transit-Oriented Development (TOD). While other designers and planners had supported similar ideas, it was Calthorpe, who popularized and coined the concept of TODs when he authored “The New American Metropolis in 1993 (Carlton 2007). He further developed and expanded the notion in the “The Regional City” 2001 and “Urbanism in the Age of Climate Change” 2011. He viewed TODs as the holistic alternative to sprawl (Calthorpe, The New Amercian Metropolis 1993), not only providing a pleasant and walkable neighborhood, but also providing an economic, ecological, and social foundation for regional development.

Calthorpe helped inspire a new generation to think about sustainability and environment, and helped launch ‘sustainability’ as the defining goal of many ecological efforts (Calthorpe Associates 2013). Around the same time he authored “The New American Metropolis,” he co-founded the Congress of New Urbanism (CNU), an “organization promoting walkable, mixed-use neighborhood development, sustainable communities, and healthier living conditions” (Congress for New Urbanism 2012). Along with the design beliefs of CNU, his concept of TODs, and vision for regional growth, Calthorpe helped transform design and planning in America and redefined the ‘American Dream’.

This paper will examine the potential for Atlanta’s MARTA stations to develop as TODs, according to commonly held definitions of TODs, especially to the work of Peter Calthorpe. First, this paper will define TODs, by reviewing Calthorpe’s writings and projects and other work situated with TOD research and practice. Second, based on this definition of TODs, this paper will analyze the prospects for creating TODs at MARTA stations. This will be answered in two stages. First, a brief review of each station, based upon MARTA’s existing research and analysis and surrounding situations – existing built up areas, undeveloped areas, uses, demographics, and environment. Second, I will perform my own analysis based upon urban morphology and walkability. I will then use this result to determine the ability of each station to support TOD development, as it currently exists. This paper is to serve as a foundation for MARTA and the Atlanta region to build upon in developing smart growth strategies, incorporating TODs, as a viable alternative to current sprawl development patterns.

CHAPTER ONE

History of Transit-Oriented Development

The first true TOD projects in the United States began in the late nineteenth and twentieth century. They developed around railroads and streetcar suburbs (Mineta Transportation Institute 2001). The steam engines of the day were slow to accelerate and decelerate, forcing the stations, along the railroad, to develop several miles apart, aiding development in the outlying suburbs. Electric streetcars on the other hand, gained power from overhead lines, while they could not achieve the speeds of commuter rails, they could stop and start more quickly. This allowed for closer station spacing and contributed to the growth of the suburbs more than any other development (Mineta Transportation Institute 2001). According to Robert Cervero, “the success of the streetcar suburbs was dependent on pedestrian access to transit for connection to downtown jobs and neighborhood services.” These early transit neighborhoods included a centrally located transit depot, public space, small cottage-type houses, and a street pattern and scale that allowed convenient walking distance to transit (Cervero 1993). Many of the qualities found in the early streetcar suburbs are major elements of modern day TOD design and are still present in many first-ring suburbs across the country.

Evolution of Transit-Oriented Development

Transit has been around since the days of horse and buggy streetcars. Cities, for better or worse, have been shaped by their transportation mode and development has always center around transit. As development spread out of the cities and into the suburbs, development became increasingly focused around transit stops. During the early part of the twentieth century, the streetcars that served first ring suburbs were usually developed by a single owner, who built the transit to add value to the surrounding residential development. The phrase “development-oriented transit” describes these early suburbs better than transit-oriented development, because the transit was built to serve development. As part of these transit systems, small retail and commercial districts, that served the commuters and residents, developed around the transit stops. These districts, in some degree, are an early form of the modern day TOD (Dittmar and Ohland 2004).

In many ways, this kind of development shaped the urban and suburban fabric of America. The relationship between transit and suburban real estate laid the foundation for the decentralization of the American city. Sam Warner, in “Streetcar Suburbs,” describes this as creation of “a two part city: a city of work separated from a city of homes” (Warner 1978). This two-part city, observed by Warner, is the birth of the suburban ideal in America. As transit started to decline, cities and development increasingly became more accommodating to the automobile.

As the automobile grew in popularity, designers and developers began to create, ‘new towns’

or new developments that increasingly sought to better accommodate the car. One of the most famous ‘new towns’ was Radburn, NJ, although it did not attract many residents, because of the depression, its design was heavily influential on almost every subsequent suburban development. Its innovative design separated automobile and pedestrian traffic. It provided safe grassy areas for children and pedestrians to utilize while providing wide streets, superblocks, and cul-de-sacs that provided owners with convenient access to their homes (Foster 1981).

After World War II, automobile use became the primary mode of transportation. In 1956, President Eisenhower created the Interstate Highway System, which provided quick, easy, limited vehicular access (Carlton 2007). The system gave Americans access to places previously inaccessible by transit and consequently spawned development in more remote places and laid the path to sprawl development, which ultimately killed off mass transit.

As development inched further away from cities, urban areas began to decline, automobile use became more frequent, and road congestion continually worsen causing governments to reconsider public transit. President Johnson stated, “to conserve and enhance values in existing urban areas is essential, but at least as important are steps to promote economic efficiency and livability in areas of future development. Our national welfare therefore requires the provision of good urban transportation, with the properly balanced use of private vehicles and modern mass transport to help shape as well as serve urban development” (Carlton 2007). Subsequently, in 1964 the President passed the Urban Mass Transit Act, which provided federal funds for the development of extensive rail transit systems. Atlanta, San Francisco, and Washington DC were selected as the recipients of federal funds and by the 1970s; each city was providing rail transit. Unfortunately, the new rail systems were primarily designed as park and ride systems. Private vehicles were required to access the suburban stations, so they failed to live up to their full potential and never gained substantial ridership numbers (Carlton 2007).

America’s dependence on the automobile reached a peak in the 1970s. The ever-increasing number of automobiles on the road and sprawling suburban development patterns had taken a toll on the physical and built environments. This resulted in the establishment of the Environmental Protection Agency (EPA) in 1971. The EPA established the Clean Air and Water Acts that required designers and developers to take steps to reduce developmental impacts on the environment (Carlton 2007). Then in 1973, the Organization of Petroleum Exporting Countries (OPEC) issued an embargo against the US and other countries, sending the price of petroleum and gas skyrocketing. America’s over-reliance on the automobile became blatantly apparent and it quickly realized that it could not sustain existing suburban development patterns (Carlton 2007). The price of oil continued to rise steadily during the latter part of the 70s and prices peaked again in 1979 due to a decline in production.

These events challenged the American way of life. Designers and planners began to protest

low-density, auto-oriented sprawl and began to develop alternative development patterns (Carlton 2007). The most influential alternative was neo-traditional urbanism or new urbanism. New urbanism “promotes walkable, mixed-use neighborhood developments, sustainable communities, and healthier living conditions” (Congress for New Urbanism 2012). Andres Duany and Elizabeth Plater-Zyberk were one the first designers to champion new urbanism designs. They designed the village of Seaside, which was a high density, mixed-use, walkable community in the panhandle of Florida. Seaside had a profound impact on developers who saw this as the new trend in development. It was also influential on other designers of the day, who began to develop concepts based off the idea of Seaside. One of the main concepts developed were urban villages. Similar to Seaside, these villages were high density, mixed use communities that focused on the pedestrian and auto-independence (Carlton 2007). While these notions promoted a new development alternative, they were still designed for automobiles. Eventually over time, these villages matured in a more transit friendly design that offered a variety of transit options, called transit villages. These transit villages resembled transit-oriented developments in appearance, but differed significantly because they still focused on the automobile as the primary mode of transportation (Carlton 2007).

Calthorpe and TODs

While these concepts created more compact and ‘smart’ developments, they still did not attempt to solve the glaring problem in America, over reliance on the automobile. Another designer of the new urbanism and sustainability movement, Peter Calthorpe, recognized this fact and began to focus his work on compact, walkable, and environmentally friendly developments. In 1986, he coauthored, along with Sim van der Ryn, “Sustainable Communities,” in which he pointed to older cities and streetcar suburbs as a model to provide a framework for more compact and efficient communities (Calthorpe and Van der Ryn, Sustainable Communities 1986). While they did not introduce transit into design, they did seek to shorten automobile trips, reduce through traffic, and strengthen the hierarchy of streets. Although the book does not address transit-oriented design, it does begin to lay the early foundation of modern TODs. Calthorpe, in the history section, focuses primarily on Ebenezer Howard’s Garden Cities movement, which focuses on reducing overcrowding in industrialized cities by creating small ‘garden cities’ clustered around a larger city all separated by country and interconnected by railways (Carlton 2007). While the book was not influential in changing transportation patterns, it did inspire Calthorpe to create transit-focused designs (Carlton 2007).

After “Sustainable Communities,” Calthorpe applied for a grant from the National Endowment of the Arts to focus on and further develop his work on urbanism and environmentalism. He developed a conceptual design based on neo-traditional principles called the Pedestrian Pocket (Carlton 2007). He worked closely with UC Berkley and University of Washington architecture professors, who taught design studios that focused on Calthorpe’s conception. The results were published in a book called “The Pedestrian Pocket Book.”

The pedestrian pocket is defined as “a simple cluster of housing, retail space, and offices within a quarter mile walking radius of a transit system” (Kelbaugh, et al. 1989). Pedestrian pockets are typically between 50 to 100 acres and are zoned to encourage a mix of uses, which supports a variety of transportation options. The goal of the pocket park is to provide people with a choice between walking, driving, carpooling, or mass transit. They are not meant to be new towns, but to “weave back together the currently isolated parts of our suburban environment” (Kelbaugh, et al. 1989). Pockets are located on dedicated right-of-ways that evolve with growth. Instead of bearing the cost of a complete rail system, these right-of-ways could exclusively accommodate car pools, bikes, and buses. Eventually, pedestrian pockets would accommodate rail transit, connecting existing town centers, employment districts, and other nodes. They are not meant to stand alone, rather they are intended to form a network offering future long-range growth for the region and each varying in use, arrangement, and design (Kelbaugh, et al. 1989).

Pedestrian pockets shared many design characteristics of modern-day TODs. They differed in that pockets were only meant to “weave back together the suburban environment” rather than offer a new alternative to sprawl. Even so, Calthorpe was extremely optimistic about the ability of pedestrian pockets to change transportation trends in America. He began to promote his pocket concept and as it gained popularity, municipalities began to turn to him for assistance.

In 1987, Sacramento, CA opened their first light rail line and shortly after, a local group called Local Government Commission (LGC), pressured county officials to begin a transit-focused, land use study. By 1989, the county had obliged to LGC’s demands and hired Calthorpe to develop a set of zoning guidelines for “Pedestrian/Transit Oriented Development.” Even though the plan contained the term TOD, he still promoted and referred to the concept as a pedestrian pocket concept. In an effort to develop a broader set of guidelines, LGC hire several nationally recognized designers to assisted Calthorpe in developing design and zoning guidelines. The results were presented to the LGC in 1991 and were called the Ahwahnee Principles (Carlton 2007).

One of the first projects to be developed under the new principles was Laguna West. Calthorpe was the lead designer for the project. The development was based on the pedestrian pocket concept. Laguna West was the first built implementation of Calthorpe’s pedestrian pocket concept. It received national media attention and the New York Times published an article calling the project a transit-oriented development and declaring TOD “the next evolutionary stage of the American Suburb” (Carlton 2007). After the article, Calthorpe began to refer to pedestrian pockets as TODs and the concept began to evolve into a regional solution rather than a patchwork fix to suburban development.

Following the conclusion of the Ahwahnee Principles and Laguna West, the city of San Diego was facing increasing traffic congestion, dwindling affordable housing, diminishing open space, degrading environmental conditions, air pollution, and socially isolated communities. So in

May 1991, the city hired Calthorpe to “prepare design guidelines, incentives, and implementation strategies aimed at redirecting urban growth patterns which encourage non-automobile travel, yet protect the city’s quality of life” (Calthorpe Associates 1992). Calthorpe developed a set of design guidelines for TODs that addressed future growth, but maintained quality of life. These guidelines were based on several guiding principles: maximize existing urban areas, reduce consumption of non-urban areas, establish land use strategies that encourages transit, reduce the number of auto trips by creating opportunities for alternative modes of travel, protect the natural environment, reduce emissions and conserve energy resources, provide a diversity of housing, and foster more vital, interactive, and secure communities (Calthorpe Associates 1992). These principles would become the foundation for future design and development of TODs.

The guidelines represented the culmination of decade long evolution of the TOD concept. It was the first time that Calthorpe defined and established a definition for TODs. In 1993, building upon the San Diego guidelines, Calthorpe wrote “The Next American Metropolis.” It was about the American Metropolis and all its parts, the ecology of communities, who Americans are, how patterns of settlement affect our community and environment, and how things can change (Calthorpe, The New Amercian Metropolis 1993). Using TODs as the foundation for growth and development, Calthorpe provides a metropolitan planning “handbook” that defines a “new American Dream and new American Metropolis.”

Around the same time Calthorpe was working with the cities of Sacramento and San Diego, Oregon was going through some similar planning and transportation issues. The state was conducting a study for a proposed freeway along the western side of Portland. Opponents argued that this freeway would produce more sprawl, destroy the environmental integrity of the area, and violated the urban growth boundaries set-up in the 1970s to limit sprawl development. A public interest group called the 1000 friends of Oregon, which had organized in support of the growth boundaries, rose up in opposition against the proposed freeway. The group began an alternative land use study called “Making the Land Use, Transportation, Air Quality Connection (LUTRAQ), with the goal to provide a feasible alternative for future regional growth that provided different transportation investments (Calthorpe and Fulton, The Regional City 2001). LUTRAQ ultimately envisioned a new regional transit system, rather than a new highway. Hired as an urban design consultant to the study, Calthorpe and the group began to study demographic data, housing and job markets, and available land in the region. They found an increase in single-person households, empty nesters, and a large transient population within the area, all of which created a demand for higher-density housing. They found that, like most cities, Portland’s suburbs failed to provide enough affordable, multi-family housing options (Calthorpe and Fulton, The Regional City 2001). Calthorpe and the group believe that TODs could help satisfy this unmet demand. The group also found that at least a third of the land within the UGB was underutilized, land that would be available for TOD growth.

The group began to create an alternative countywide land-use plan that accommodated future population and job growth by mixing TODs with standard development types. After several years of modeling data and conducting studies, the group presented LUTRAQ to the Oregon Department of Transportation (ODOT) and in 1996; it recommended an alternative to the western freeway using LUTRAQ land-use and light rail proposals. The LUTRAQ concepts even helped change planning at the state level, which now promotes compact pedestrian and transit friendly development and requires the consideration of alternative land-uses in transportation planning (Calthorpe and Fulton, *The Regional City* 2001).

Following the success of LUTRAQ, other regions began to analyze new alternatives for future growth. In Seattle and Salt Lake City, regional planning initiatives were started that analyzed smart, compact, TOD-like growth as an alternative sprawl. These initiatives, like Portland, were successful at changing the regional planning policies and development.

As the TOD concept gained popularity, it became vividly apparent to Calthorpe that the key to the long-term success of TODs was coordination and commitment at a regional, state, and federal level. With the exception of few progressive regions, sprawl was continuing to dominate the American landscape. Calthorpe recognized that TODs alone could not solve sprawl, but like in Portland, there must be a commitment at the regional level.

In 2001, Calthorpe wrote the book “*The Regional City*,” in which he laid out the processes, policies, and designs to combat sprawl on a regional level. He provided a framework for a regional city, in which he described TODs as the building blocks for a region. The fundamental purpose of the regional city was to create diversity at the regional and neighborhood level, while seeking to combat inequality as well as sprawl. As he viewed “the regional city [was a] cohesive unit – economically, ecologically, and socially – made up of coherent neighborhoods and communities, all of which play a vital role in creating the metropolitan region as a whole” (Calthorpe and Fulton, *The Regional City* 2001).

As Calthorpe’s TOD concept has evolved over time, from sustainable communities to pedestrian pockets to TODs and finally into regional cities, it has become apparent that each stage cannot act on its own, but that each stage of the process builds upon each other. The TOD concept only began to imply a regional framework. It alone cannot change the growth patterns of a region. Regions must be designed and laid out with the same urban design principles that guide development for neighborhoods and towns (Calthorpe, *Urbanism in the Age of Climate Change* 2011). Ultimately, regions must make a commitment to design and promote smart, compact, and sustainable development. A substantial change in regional policy can be more influential than any single TOD neighborhood.

Development patterns have constantly changed with technology and housing demands over

time. While no one can predict the future, one thing can be certain; America cannot continue to sustain its current patterns of sprawl development. The solution is simple; smarter, more compact, more transit oriented development; but the problem is complex. A fundamental shift in land-use, transportation, and zoning policies is required at the local, regional, state, and federal level. While TODs alone are not the answer, as seen in Portland, San Diego, and Sacramento, they can serve as the catalyst of change for an entire region.

CHAPTER TWO

TOD Principles and Guidelines

“The Next American Metropolis” was the first book to define TODs. In the book, Calthorpe moves from the general to the specific. He divides the book into three sections. The first lays out the philosophical and practical reasoning behind TODs. The second, he forms the definitions and guidelines, then describes how they can change. In the last section, he provides examples that demonstrate the application of the principles and guidelines for a wide range of projects, from regional planning to small infill sites (Calthorpe, The New Amercian Metropolis 1993).

Calthorpe states the old suburban dream is increasingly out of sync with modern culture. The makeup of the home has dramatically changed over the course of the last four decades. Wealth, family size, and environment are all shrinking. The lack of affordable housing in the city has Americans moving further out in search of more affordable housing. As a result, more sprawling developments are being built to satisfy the demand, causing Americans to become more isolated, spend more time in their vehicles than at home, and is having an irreversible effect on environmental quality. Our local laws have done nothing to prevent this type of sprawl. Sprawl unintentionally promotes segregation by age, wealth, and race. In order to “redefine the American Dream” Calthorpe states, “we must make communities more accessible to our diverse populations” and “diversity, community, frugality, and human scale should be the foundation for the new American Dream and Metropolis” (Calthorpe, The New Amercian Metropolis 1993). Calthorpe states “the alternatives to sprawl is simple and timely: neighborhoods of housing, parks, and schools placed within walking distance of shops, civic spaces, jobs, and transit – a modern version of a traditional town” (Calthorpe, The New Amercian Metropolis 1993). These neighborhoods, called TODs, if applied at a regional scale, could provide a network of mix-use neighborhoods that could help balance the inner city development with suburban investment by creating nodal, compact growth organized around a regional transit system. TODs would ultimately provide an affordable option for the working class, while being environmentally sensitive and cost-effective. Success of such a strategy would mean not only local commitment to change, but also a regional and federal commitment.

Definitions

“A transit-oriented development (TOD) is a mixed-use community within an average 2,000-foot walking distance of a transit stop and core commercial area” (Calthorpe, The New Amercian Metropolis 1993). It provides “moderate and high density housing, along with complementary public uses, jobs, retail and services. They seek to bring many destinations together within walking distances, so that trips may be combined, reducing reliance on the automobile. The uses and configuration of TODs must relate to the surrounding areas and neighborhoods. They must be

located along or near trunk-line transit or a feeder bus line. Each TOD will vary in size, depending on the location and type. The average walking distance represents a distance that an average person is willing to walk before use of an automobile is considered. This 2,000-foot range usually takes plus or minus ten minutes to walk, for the majority of people. This distance will vary based on topography, climate, aerial roads, or other features (Calthorpe, The New Amercian Metropolis 1993). Several key principles of TODs are to:

- organize growth on a regional level to be compact and transit-supportive;
- place commercial, housing, jobs, parks, and civic uses within walking distance of transit stops;
- create pedestrian friendly street networks which directly connect local destinations;
- provide a mix of housing types, densities, and costs;
- preserve sensitive habitat, riparian zones, and high quality open space;
- make public spaces the focus of building orientation and neighborhood; and
- encourage infill and redevelopment along transit corridors within existing neighborhoods” (Calthorpe, The New Amercian Metropolis 1993).

Location and TOD types

TODs should only be located in redevelopable, infill, or new growth areas. Redevelopable sites are areas that could be revitalized with more intensive uses and transit services. Infill sites are vacant parcels that are surrounded by urban development. New growth areas are larger, undeveloped areas that could accommodate future growth. These areas are usually located on the edge of the city. All of these areas should be identified at the regional level to ensure a cohesive growth strategy (Calthorpe, The New Amercian Metropolis 1993).

TODs should be located within the region to maximize access and use of their core commercial areas from the surrounding area. This must be done, so that users do not have to solely rely on the use of arterials. TODs with competing uses should be located at minimum one mile apart. This spacing is based on the market area that is required to support an anchor retail store, such as a supermarket. TODs without competing uses, may be located closer than one mile apart, but should be based on the transit circulation system (Calthorpe, The New Amercian Metropolis 1993).

There are two types of TODs, urban and neighborhood. Urban TODs are located directly on the trunk-line transit and are higher in densities. They are usually space between a half-mile and a mile apart. Neighborhood TODs are located along local or feeder bus line within ten minutes of transit travel time to a trunk-line transit station. They are usually lower in density and focus primarily on residential and local uses (Calthorpe, The New Amercian Metropolis 1993).

Coordinated Planning

“Regardless of the size, number of developers, or property owners, the development of the TOD must provide a coordinated plan for the entire area” (Calthorpe, The New Amercian Metropolis 1993). This coordinated plan is called the “Specific Area Plan” and it must be consistent with the design guidelines, coordinate with the surrounding areas, and provide strategies for financing and construction. It must create zoning that encourages a mix of uses, rather than isolated, single uses. It also must coordinate with the surrounding community to allow for consistent street alignments and land uses. The Specific Area Plan provides for a community and regional coordination that standard zoning simply cannot achieve (Calthorpe, The New Amercian Metropolis 1993).

Ecology and Habitat

Open space environments should be preserved. Rivers, creeks, riparian habitat, wetlands, slopes, and other sensitive environmental areas should be incorporated into the TOD as open space. Piping and channelization should be avoided at all possible. These environmental areas should be treated as key amenities, rather than boundaries to the development. These areas should be connected to a larger greenway trail system that connects the region together, while at the same time preserving wildlife corridors (Calthorpe, The New Amercian Metropolis 1993).

Urban Growth Boundaries (UGB) should be established at the edges of metropolitan areas to protect existing natural resources, as well as provide a buffer between existing towns and cities. The area within the UGB should be transit accessible and planned for long-term development. UGBs must be created at the regional level, so that multiple jurisdictions are represented. The man goal of the UGB is to prevent development from occurring in inappropriate areas (Calthorpe, The New Amercian Metropolis 1993).

TODs should be developed in a way that promotes energy conservation. Green energy and construction techniques should be utilized whenever possible. Reducing auto use within the TOD can significantly reduce energy consumption. Native and drought tolerant plant species should be used to help minimize the use of water (Calthorpe, The New Amercian Metropolis 1993).

Core Commercial Areas

Each TOD must have a mixed-use core commercial area located next to the transit stop. At the very least, the core area should provide convenience retail and local-serving offices. The core area should have a public green or plaza to serve as a community focal point and activity center. The core area must represent at least 10% of the total TOD. It must be located adjacent to the transit stop. While uses can spread over multiple areas, a minimum amount of commercial should be located next to the transit stop (Calthorpe, The New Amercian Metropolis 1993).

The layout of the commercial area should balance pedestrian and auto access. While a “main street” retail strip is encouraged for smaller stores, larger, anchor stores must have access to local streets and an adequate supply of parking. The parking lots should be located behind the store, so that store frontage along the street is maximized. Building setbacks for commercial stores and uses should be minimized and sidewalks should be designed to encourage pedestrian activity. Entrances must be oriented toward sidewalks or public plazas. Buildings façades should have windows and multiple entries along the sidewalks and avoid large, blank walls. This creates a more vibrant walking and sidewalk experience. (Calthorpe, The New American Metropolis 1993).

Residential Areas

TOD residential areas include housing that is within convenient walking distance from the core commercial areas and transit stops. Density requirements should be met with a mix of housing types, including small single-family lots, townhomes, condos, and apartments. Urban TODs must have an average of 15 units per net acre, while neighborhood TODs should have an average of 10 units per net acre. Community Plans or Specific Plans should specify minimum density requirements for each area (Calthorpe, The New American Metropolis 1993).

Residential setbacks should be minimized and parking should be located to the rear at all possible. Minimal setbacks create safer streets that are more active. Residential building design should be varied, but articulated to provide visual interest to the pedestrian. Garage doors that face the street must be recessed, so it is not the dominate feature. Residential units should have front porches facing the street. Front porches create a semi-private area, while creating opportunities for social interactions with neighbors (Calthorpe, The New American Metropolis 1993).

Secondary Areas

Each TOD may have a secondary area adjacent to it, including areas across an arterial. The secondary area may not be further than one mile from the core commercial area. Any area located near the transit stop, but separated by an arterial road is considered a secondary area. These areas provide a location for uses that are not appropriate in the TOD because they are lower in density and more auto-oriented. However, these areas provide market support for the businesses and offices in the core commercial area. The residential areas within secondary areas should have an average minimum of six units per net acre. Uses that rely heavily on auto, trucks, or have very low employment intensities, such as rural residential or industrial areas, are not appropriate for location within the TOD or its surrounding secondary area (Calthorpe, The New American Metropolis 1993).

Park, Plazas, and Civic Buildings

Public uses are required to serve the residents and workers in TODs and surrounding areas.

Small public parks and plazas must be provided to meet the local population needs. Small parks should be located throughout the TOD and larger parks should be located towards the edge or near schools. Parks should comprise a minimum of 5% of the total TOD area. A ratio of 3.5 acres of park space per thousand people is advisable because parks help develop a strong sense of community, participation, identity, and conviviality is important to support a sense of safety and comfort within a neighborhood (Calthorpe, The New American Metropolis 1993).

Plazas should be developed for both active and passive use. They should reinforce the character of the surrounding area. Plazas should be incorporated in the transit stop and should be next to retail shops. They should provide safe and comfortable public spaces (Calthorpe, The New American Metropolis 1993).

Civic buildings, such as courthouses, libraries, post offices, recreation centers, etc., should be placed around the transit stop as highly visible focal points. Civic buildings can enhance the surrounding area as well act as landmarks that reinforce connections. Major entries should face public streets or plazas. The integration of civic life is essential for reestablishing strong communities (Calthorpe, The New American Metropolis 1993).

Schools, if needed, should be located at the edge of the commercial core or within the secondary areas close to the residential areas that they serve. Size and layout should be determined by local agencies (Calthorpe, The New American Metropolis 1993).

Streets and Circulation System

The street system should be designed to maximize pedestrian safety, without compromising automobile access and safety. Street widths, design speeds, and travel lanes should all be reduced and on-street parking and bike lanes should be added. Travel speeds should be no more than 15 mph and lanes should be 8-10 wide. Within the core area, there is no reason or significant amount of time saved traveling more than 15 mph. Intersections should be designed to minimize crossing distance for pedestrians. Street trees and sidewalks are required along all streets. Trees should be placed no more than 30 feet on-center and sidewalks should be at minimum of 5 feet wide in residential areas and 10 feet wide in commercial areas (Calthorpe, The New American Metropolis 1993).

The street system should be laid out in a grid-like system to minimize dead-end streets and to maximize connections and alternative routes within the TOD. Arterial streets should be located on the edge and should never pass through the TOD. “Connector” streets are the main streets that provide connections within the TOD to secondary areas, schools, and core commercial areas without requiring the use of an arterial road. Connector streets are not meant to provide a through-route to alternative arterials. “Commercial” streets are located in the center of the TOD

and provide access to transit and shopping. These streets are subservient to the pedestrian and create a safe and pleasant shopping environments. “Local” streets should be narrow enough to slow traffic, but still provide adequate automobile and service vehicle access. These streets are the primary residential streets. Alleys provide service to residential and commercial uses. They allow access to buildings, without destroying the residential setbacks. Alleys should be used whenever possible (Calthorpe, The New American Metropolis 1993).

Pedestrian and Bicycle System

Pedestrian routes should be located along or be visible from all streets. They must provide clear, safe, and comfortable access to the core area and transit stop. Separation of pedestrian routes from the streets should be avoided. Separate routes can be dangerous because the lack of surveillance. Comfortable, convenient, and safe pedestrian routes are vital to reducing automobile trips (Calthorpe, The New American Metropolis 1993).

A well-connected bike system should be incorporated in the TOD as well as the larger regional TOD system. Bike paths should be integrated onto the street system and separated bike paths should be provided along arterials roads. Bike access is also vital to reducing automobile use. Sufficient bike parking and facilities should be located around commercial areas and the transit stop. They should not block the pedestrian routes (Calthorpe, The New American Metropolis 1993).

Transit System

A transit system can help define the density, location, and quality of growth within a region. Therefore, transit lines must be located to provide the maximum amount of area for TODs to develop and grow. Transit stops should be centrally located and adjacent to the core commercial area. Accessibility is vital to transit ridership. Transit stations should be comfortable, safe places to gather and should accommodate weather conditions year-round. The frustration of waiting for transit can be reduced if a lively, inviting atmosphere is created. Parking should never be located adjacent to the transit station. Kiss-n-ride areas, park-and-ride lots, and bus drop-offs should never isolate the pedestrian from access to the transit station. Park-and-ride lots should never be located in the core commercial area. They are best located in close secondary areas or at the end of the transit line (Calthorpe, The New American Metropolis 1993).

Parking Requirements and Configuration

Reduced parking standards should be utilized within TODs to encourage a pedestrian friendly environment. Parking maximums should be enforced within non-residential areas. Joint parking or shared parking, is recommended within commercial areas. Retail, office, and

entertainment would share parking lots and garages. Parking mitigation measures should be used, at the edge of the commercial and residential areas, to guard against “spillover” parking. Spillover parking can have a negative impact on the surrounding neighborhood. Parking garages should not dominate the street frontage. First floor retail is strongly encouraged in garages that face the street. Large surface lots are strongly discouraged, in favor of several smaller lots. No parking area should be greater than three acres. All surface parking should be planted with trees and other landscaping to screen the lot from the street. Within ten years, 70% of the parking lot should be shaded. The use of permeable pavement is strongly encouraged (Calthorpe, The New American Metropolis 1993).

The guidelines that Calthorpe has developed provide an overview for the goals and principles for TOD development. Each place will have unique and special conditions that should enhance and modify the TOD concept. These guidelines are not meant to be a universal model, they should be modified based upon each place and situation. Designed to provide direction for regional planning, Comprehensive Plans, Specific Area Plans, and zoning ordinances, they form the foundation for smart, anti-sprawl development.

CHAPTER THREE

The Atlanta area has historically been dominated by sprawl development. New growth has spread away from the urban core into the periphery of the region, which has caused commute times to increase and forced more automobiles onto already overcrowded roads. As a result, Atlanta has one of the worst traffic congestion problems in the nation. According to Texas A&M Transportation Institute, the average commuter in Atlanta spends a total of 52 hours in traffic and over a \$1,000 on congestion related expenses per year (Texas A&M Transportation Institute 2012). The Institute ranked Atlanta as the eighth worst congested city in America in 2012 (Texas A&M Transportation Institute 2012).

The Metropolitan Atlanta Rapid Transit Authority (MARTA) has long recognized the growing traffic problem in Atlanta. In November 2010, MARTA developed a set of Transit-Oriented Development (TOD) guidelines for the Atlanta region. These guidelines were designed to be implemented around existing MARTA stations with the goal of generating greater ridership, promoting a sustainable and affordable future, and to generate a return on MARTA's transit investment (Metropolitan Atlanta Regional Transit Authority 2010). The guidelines help MARTA play three important roles in the community; as a TOD sponsor for "joint development" on MARTA properties, as a TOD stakeholder for development occurring within a half-mile radius of stations, and as a TOD advocate for sustainable land use decisions along MARTA's transit corridors (Metropolitan Atlanta Regional Transit Authority 2010).

As an appendage to their guidelines, MARTA analyzed each rail station based on zoning and joint development opportunities. Each station was analyzed using a half-mile radial buffer. MARTA classified each station using six different typologies:

- Urban Core - contains a downtown-like mix of office, retail, and residential at very high densities.
- Town Center - contains a mix of uses at a medium density. Medium rise buildings dominate the station area.
- Commuter Town Center – similar to Town Center, but more likely to be a new center. Usually, located near major highway corridors.
- Neighborhood – Multi-family and/or neighborhood scale mix-use developments. Lower density and more residentially oriented than Town Center areas.
- Collector – usually located at the ends of rail lines and primarily park-and-ride stations that are designed specifically for automobile access.
- Special Regional Destination – A regionally significant public venue or campus-like setting.

Usually not mixed-use. Scale varies, but usually less dense and compact than TOD requirements (Metropolitan Atlanta Regional Transit Authority 2010).

Using these typologies as a foundation, MARTA analyzed population, employment, and land use data to determine TOD opportunities around each station.

My analysis will supplement MARTA’s existing research and will provide a guide for future TOD development and implementation. This will be achieved in two parts. The first part, I will analyze MARTA’s existing research and analysis. This will allow a greater understanding of MARTA’s opinions on TOD opportunities at each station. The second part will focus on my analysis, which will be based upon three steps; existing urban morphology, half-mile walking network, and a classification, based on the amount of urban design/infrastructure improvements needed, for each station.

In the first step of my analysis, I will examine each station, based on the half-mile radial buffer, to determine which types of urban tissues compose the morphological framework; the combination of lots, blocks, and streets. There are four types of urban tissues that I will identify, urban static, suburban static, campus, and elastic. Urban static tissue is development that has been highly planned. Lots, blocks, and streets were surveyed and developed together. The typical street pattern is a grid system with walkable blocks, typical of those usually found in central/downtown urban areas. These tissues are ideal for TOD and require little infrastructure improvements. Suburban static tissues are similar in nature to urban static tissues. They are both highly planned and surveyed as one, but the major difference is the street system (Scheer 2001). The typical street pattern is a dendritic system, usually consisting of a hierarchy of long, curvilinear streets that creates a superblock system that is unfriendly to walking. These tissues are usually found in suburban areas. These areas are primarily designed for automobile use and are unfit for immediate TOD development. They would require a huge amount of infrastructure improvements to support TODs. Campus tissues are significant development areas that contain large tracts of lands, usually owned by a single entity. These tissues contain many significant structures and are not usually subdivided. Internal streets are usually private and access points are kept to a minimum (Scheer 2001). These tissues are typical of shopping centers, airports, medical centers, and office campuses. Since a single owner owns these tissues, TOD development would require the area to be developed as one, to ensure that a proper TOD framework is built. These areas would need huge infrastructure improvements or would need to develop as a “new town” to support TODs. Elastic tissues are the least stable of the tissues. They consist of development that is not pre-planned and constantly changes over time. Lots vary in sizes and are constantly being subdivided based on use. Streets are limited and internal to each site, rather than composing a logical network. These tissues are typical of strip malls, gas stations, fast food emporiums, and usually contain retail, industrial, and commercial uses. They usually have a high turnover rate, causing change to happen at a much more rapid pace than in other parts of a city, making it difficult for any organized development to take place. These areas are the least ideal for TOD development.

In the second step of my analysis, I will determine a half-mile walking distance from each

station, using the Network Analyst function in GIS. This function uses street data and MARTA station points to build a network. Since sidewalk data could not be obtained for the study area, the network is based on street right-of-way. Using the network, the service area tool is used to create a half-mile walking distance around each station. For stations that are less than a half mile from each other, walking areas do not overlap, so that each station captures the population and employment closest to it. This is done so that stations are not competing for riders. I will then calculate the number of residents and employees that are within walking distance to the station. These figures will represent the potential number riders currently living and working within walking distance of each station. I will directly compare these figures to MARTA’s figures to display the difference between using a half-mile radius and half-mile walking distance.

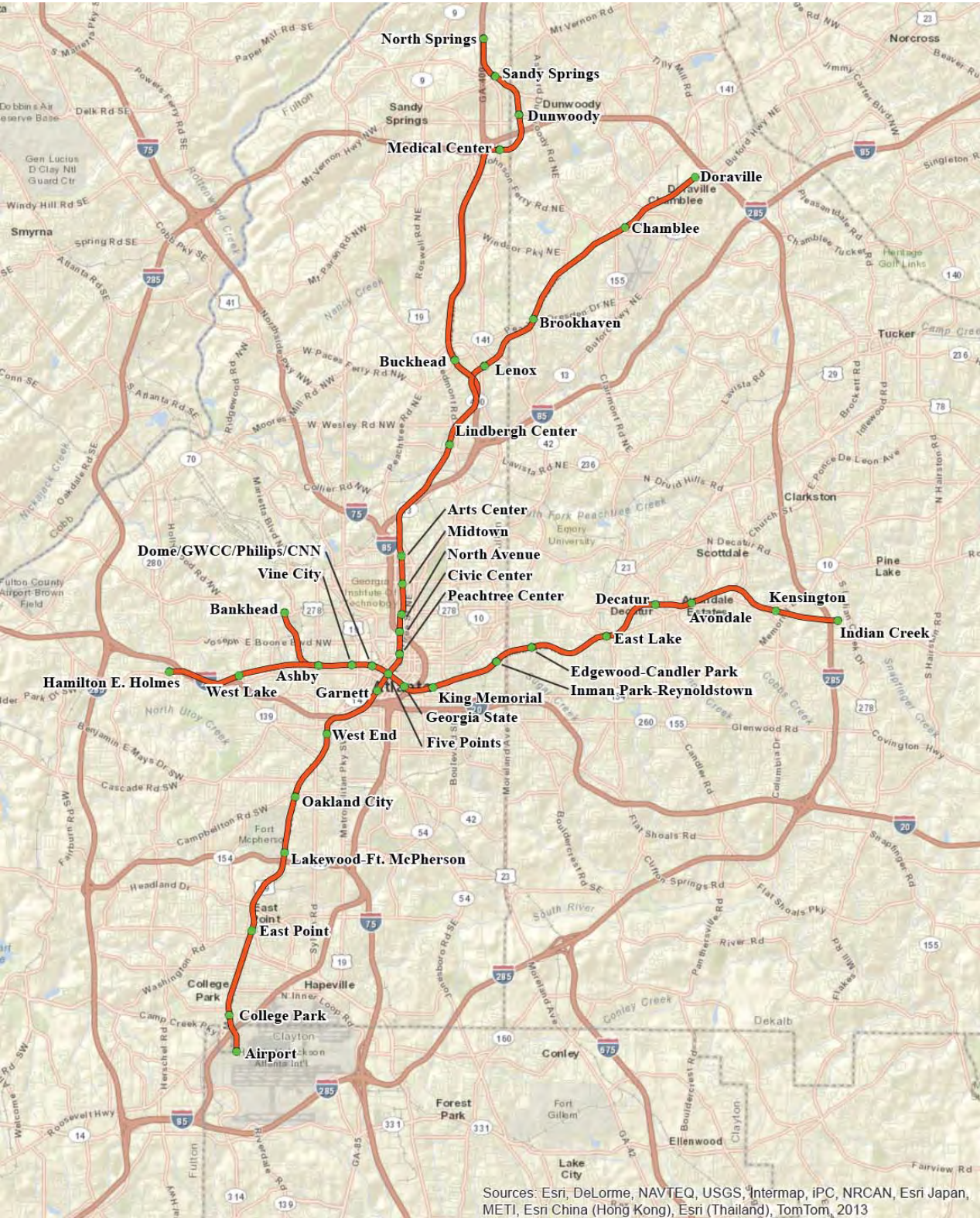
In the final step of my analysis, I will determine the suitability of each station to support successful TOD development. Using the results of the first two steps, I will classify each station, based on the amount of urban design/urban infrastructure improvements¹ required, into three categories based on Peter Calthorpe’s definition of TOD types, infill, redevelopable, and new growth areas. The first category is areas that require little improvement. These areas have a strong existing street system and a large service area with a large collection of potential riders. The second category is areas that require a huge amount of infrastructure improvement. These areas usually have a smaller service area and serve a small collection of potential riders. Large parking lots adjacent to the station usually inhibit access from the surrounding population. The last category is areas that have little or no infrastructure. Service areas are usually very small or do not exist. Park-and-ride stations are most common in this category. I will use these categories to determine, as they currently exist, the suitability of each station to support TOD development.

The goal of my analysis is to provide MARTA with an understanding urban morphology and design. So that, it can use the results to create and promote smarter, healthier, more successful TOD developments around existing transit stations. The next part of paper will provide an in-depth station-by-station analysis of the MARTA rail system.

¹ Urban design/urban infrastructure improvements refer to any utility, sidewalk, and/or street improvements

CHAPTER FOUR

MARTA STATION MAP

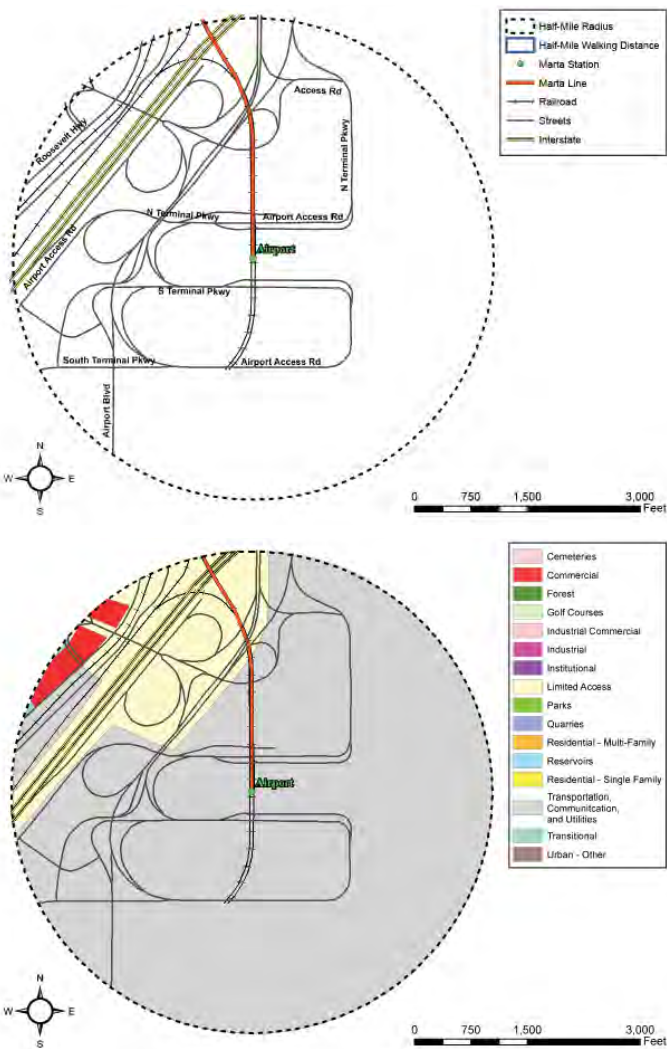


AIRPORT STATION

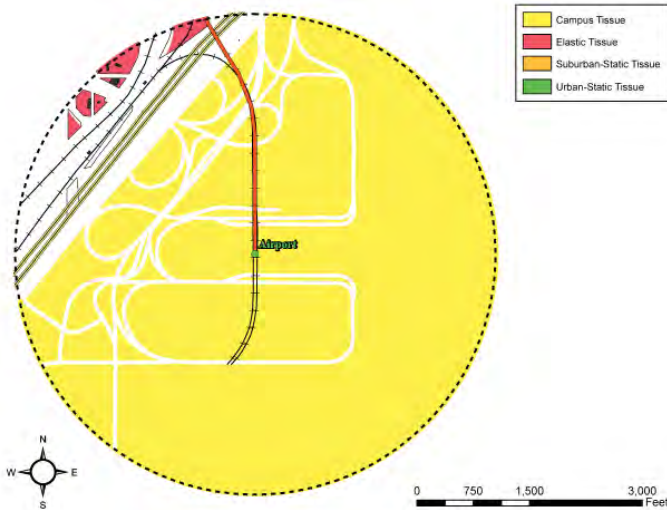
MARTA has identified the Airport Station as a special regional destination. It services Hartsfield-Jackson International Airport. The station has a high daily entry of 10,756 riders and virtually no residential population within a half-mile radius. The majority of the land use is dedicated to transportation and is unlikely to change over time. Hartsfield-Jackson will remain the single-user of the area surrounding the station. Special regulations regarding heights of buildings and uses the surround the airport, virtually guarantees that the station will never develop as a TOD (Metropolitan Atlanta Regional Tranist Authority 2012).

The urban morphology around the Airport Station is dominated by campus tissue. The streets provide access to the Airport from Interstate 75 and are unfit for pedestrian activity. The only way to access this station, outside of the terminal, is by automobile. As described by MARTA, the unique needs and regulations of the airport make it almost impossible to develop the station area as a TOD.

My analysis supports MARTA's findings. This station, because of the inflexibility of the airport, cannot and will not develop as a TOD.



| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 10,756 | - |
| Population | 4 | - |
| Employment | 5,091 | - |
| Linear Ft. of ROW | - | - |



ARTS CENTER STATION

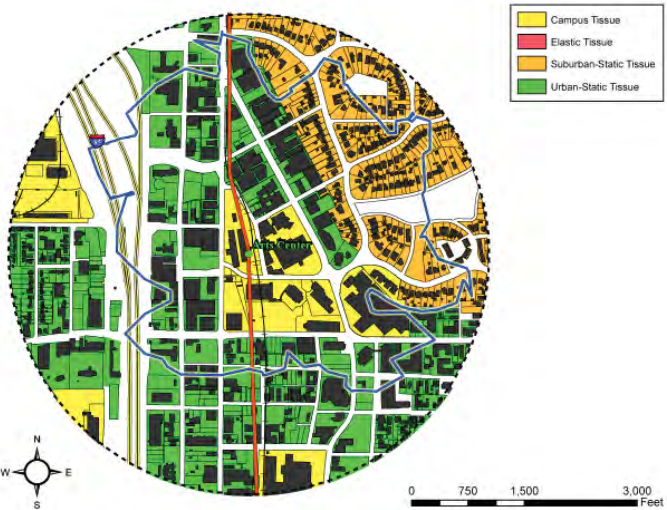
The urban morphology surrounding Arts Center Station is a mix of urban static, suburban static, and campus tissues. Most of the uses within a half-mile walking distance are high-density office space, large institutional destinations, and medium density single-family homes. The station is within a half-mile from the Midtown Station, therefore its service area is not as large as MARTA suggest. However, the station is within an existing urban area on the edge of the Midtown Business District, so its service area still encompasses a large number of potential riders. The existing street structure immediately adjacent to the station has small walkable blocks. There are some underdeveloped parcels within the half-mile walking distance that could be redeveloped as TODs.

Given that this station is located within an existing urban environment, has a walkable street system, a large number jobs within walking distance, and several underutilized or vacant parcels nearby, this station could develop as a TOD with very little infrastructure improvements. My analysis agrees with MARTA's findings.



Arts Center Station is classified, according to MARTA, as an Urban Core Station. The station is located in Midtown Atlanta and is adjacent to the High Museum of Art and the Alliance Theatre. The surrounding half-mile radius is dominated by commercial and residential uses. High-rise office buildings such as One Atlantic Center and the King and Spalding Building dominate the commercial area. The residential areas include the neighborhoods of Ansley Park, Atlantic Station, Midtown, and Home Park. There are approximately 50,162 jobs within one mile and 8,844 residents within a half mile of the station. Since there is very little land available around the station, MARTA has identified potential TOD development to occur over the station though the transfer of air rights. In addition, there is approximately 2.5 acres of vacant land or parking lots that could support TOD development (Metropolitan Atlanta Regional Tranist Authority 2012).

| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 6,672 | - |
| Population | 8,844 | 1,964 |
| Employment | 50,162 | 13,709 |
| Linear Ft. of ROW | - | 38,665 |

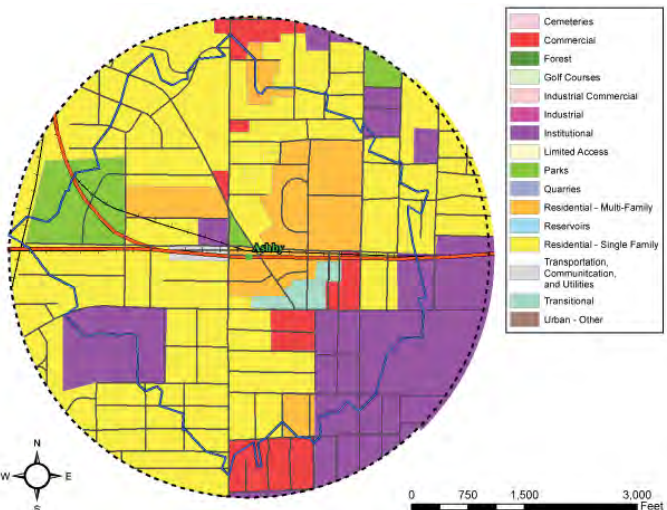
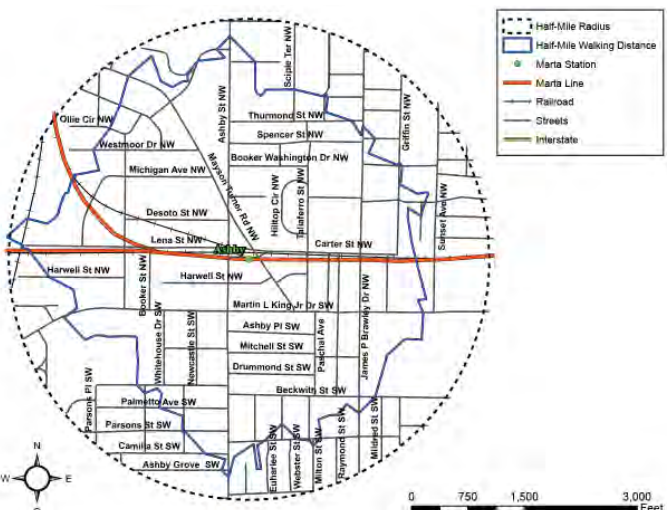
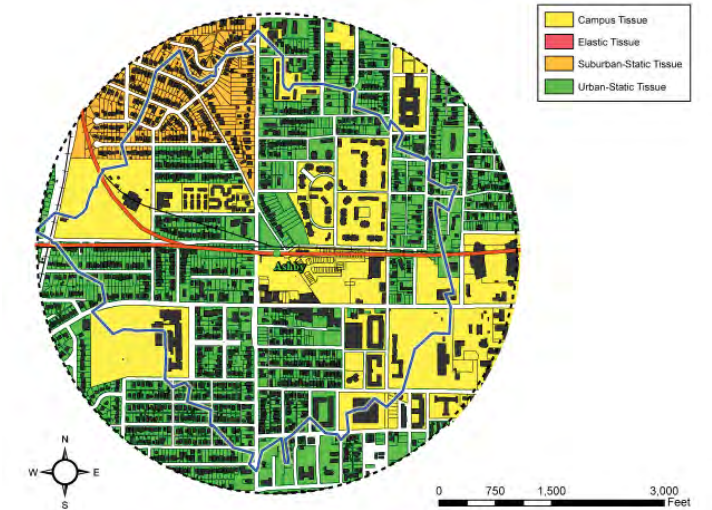


ASHBY STATION

MARTA identifies the Ashby Station as a Neighborhood Station. The station is located in western Atlanta on the corner of Joseph E. Lowery Boulevard and Lena Street. It provides rail service to the Atlanta University Center (AUC), which includes Morehouse College, Clark Atlanta University, Spelman College, and Morehouse School of Medicine. Land use within a half-mile radius of the station is dominated by residential and institutional uses. Residential uses surrounding the station are primarily multi-family apartment complexes. Approximately 5,558 people live within a half-mile radius from the station. There are very little jobs in the area, only approximately 6,689 jobs are within one mile of the station, the majority of which are in the AUC. MARTA views Ashby as a successful TOD example of residential development and transit. MARTA owns very little land around the station, therefore MARTA can only encourage any future development to be transit friendly (Metropolitan Atlanta Regional Tranist Authority 2012).

The urban morphology around the station is comprised of urban static and campus tissues. The street structure to the southwest of the station is composed of small, walkable blocks. The street structure to the northeast is a small block system that is broken up by a large apartment complex, which creates several large, uninviting blocks adjacent to the station.

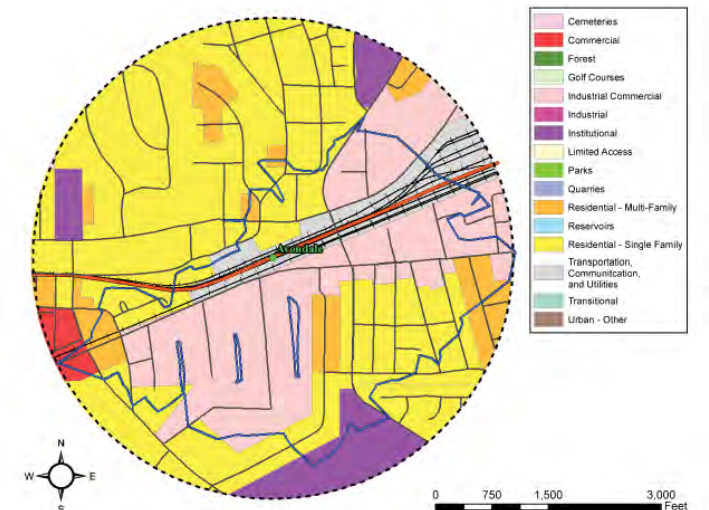
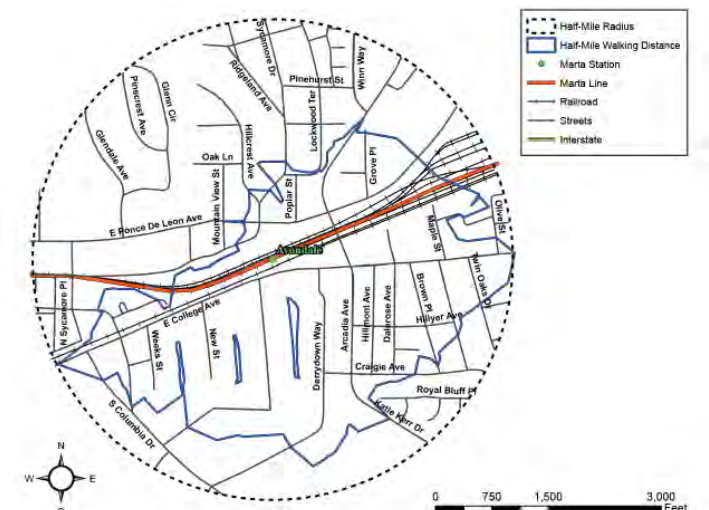
| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 2,100 | - |
| Population | 5,558 | 3,203 |
| Employment | 6,689 | 718 |
| Linear Ft. of ROW | - | 59,245 |



There is large number of residents within walking distance, few jobs, and a lack of commercial activity within the service area. The existing apartment complex that is incorporated into the station, provides convenient access for the residents, but does very little to connect into and incorporate the surrounding neighborhood. There is very little available land around the station to develop, limiting TOD opportunities. This station has several large areas of campus tissue that isolate it from the surrounding neighborhood. There would need to be a huge amount of infrastructure improvements to reconnect the station to the area. Combined with the lack of jobs and few commercial activities in the area, any TOD development would not be immediately successful.

As it currently exists, this station cannot support TOD growth. My analysis disagrees with MARTA's findings.

AVONDALE STATION



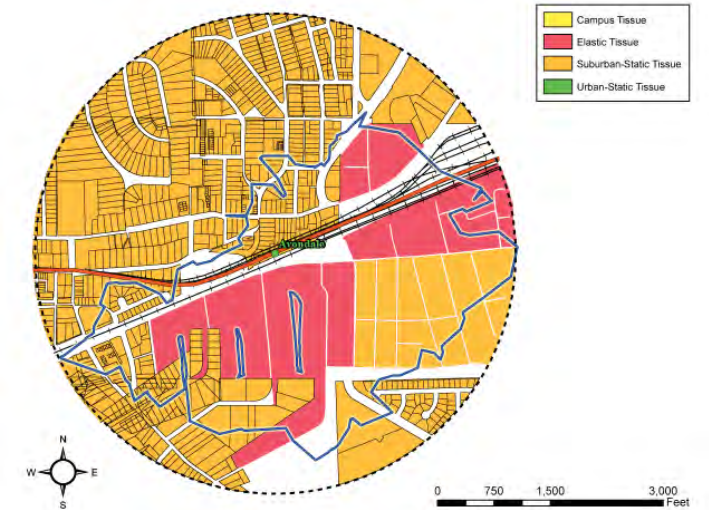
Avondale Station is a Neighborhood Station. It is located within the City of Decatur. Land use to the north is predominately-low density residential and industrial to the south. There are approximately 2,467 residents within half mile and 8,193 jobs within in one mile of the station. MARTA owns two parking lots on the north and south sides of the station. These parking lots have been identified as potential TOD opportunities. The Decatur Housing Authority proposed to build a mixed use, mixed income community within these two areas, but due to the downturn in the economy the plan was put on hold indefinitely (Metropolitan Atlanta Regional Tranist Authority 2012).

The urban morphology around the station is a mixture of elastic and suburban static tissue. A CSX railroad line dissects the service area in half. The area to the north is mostly low-density single-family homes and the area to the south is mostly light industrial uses. The street structure to the

north consists of large, organic blocks, framed by curvilinear and dead-end streets. As a result, very little of the homes to the north are within walking distance to the station. Most of the area to the south is within walking distance to the station, but the walk is inhospitable due to the lack of sidewalks and existing industrial uses. The residential area north of the station is unlikely to change, therefore, the only area suitable for TOD growth would be to the south, but because of the elastic tissue and industrial uses in the area, development would need to occur all at once. As a result, this area has very little TOD suitable infrastructure and would need to develop as a “new town.”

As it currently exists, this station cannot support TODs because of the lack of proper infrastructure. My results disagree with MARTA's findings.

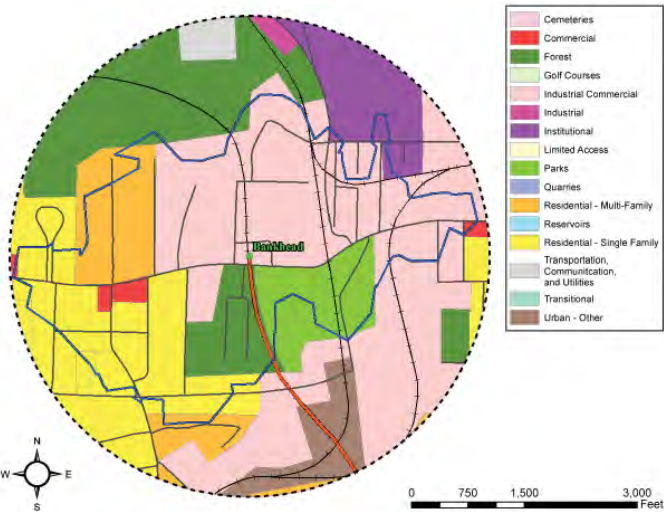
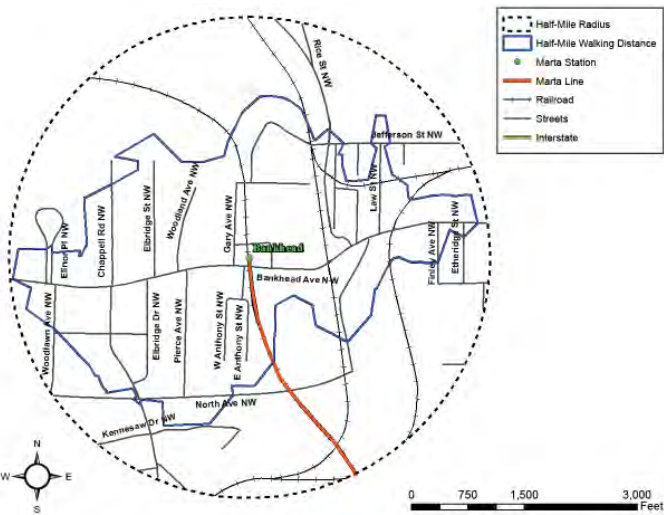
| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 4,668 | - |
| Population | 2,467 | 1,149 |
| Employment | 8,193 | 463 |
| Linear Ft. of ROW | - | 32,089 |



BANKHEAD STATION

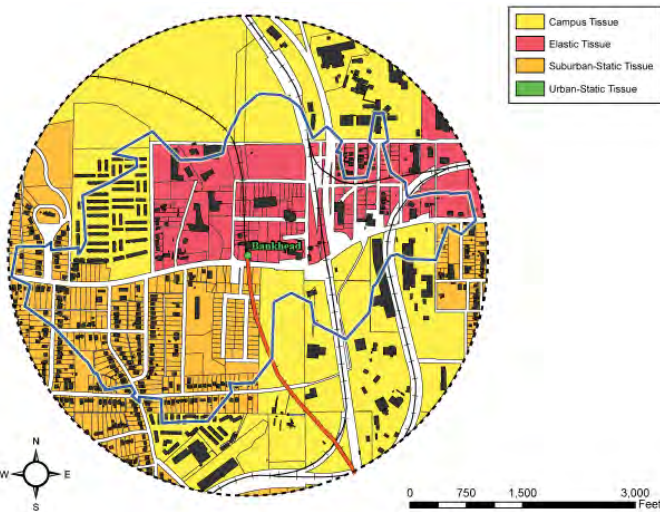
The Bankhead MARTA Station is classified as a Town Center Station. It is located several miles west of Midtown Atlanta, on the corner of Donald Lee Hollowell Parkway and Woods Street, in the Bankhead Neighborhood. The land use is primarily industrial, residential, and parks. The residential area is predominately low-density, single family homes and contains approximately, 3,730 people. Very little jobs are in the area; only 1,948 are jobs within a mile. The Bellwood Quarry is located to the north of the station, so there is an abundance of vacant land to the north. The station is located on the edge of a floodplain, which limits the opportunity for possible development, but MARTA has identified 11 acres around the station as areas suitable for a Town Center TOD (Metropolitan Atlanta Regional Tranist Authority 2012).

The urban morphology surrounding the station is a mix of suburban static, campus, and elastic tissue. The surrounding street structure is a hierarchical system. All pedestrians must walk along the main arterial road to reach the station, which creates an unsafe walking environment. The station is surrounded by industrial areas, disconnecting the neighborhood from the station. There is an abundance of vacant land surrounding the station, but the majority of the land is located within a floodplain, unsuitable for development. Most of the land around the station is campus tissue, which makes it difficult for any kind of organized



change. Any TOD would need to develop as a “new town” due to the lack of existing infrastructure.

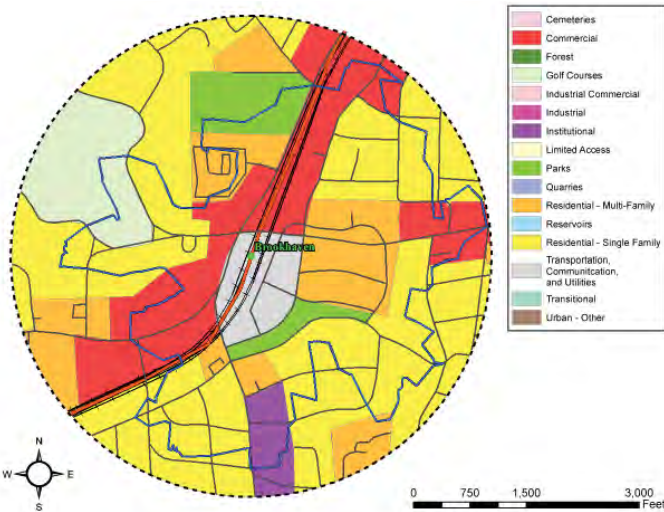
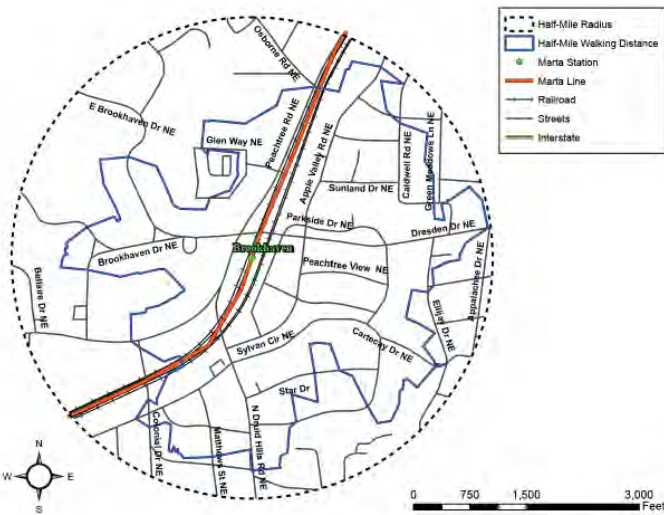
As it currently exists, the station lacks the proper infrastructure to support TODs. My analysis disagrees with MARTA’s findings.



BROOKHAVEN STATION

neighborhood going to the commercial district must cross six-lanes of traffic on Peachtree Road. As a result, the walking environment to the station is very inhospitable. There is very little vacant land around the station for TOD development. However, the MARTA parking lots and commercial areas offer opportunities for redevelopment. However, these areas would require large infrastructure improvements to connect into the surrounding area.

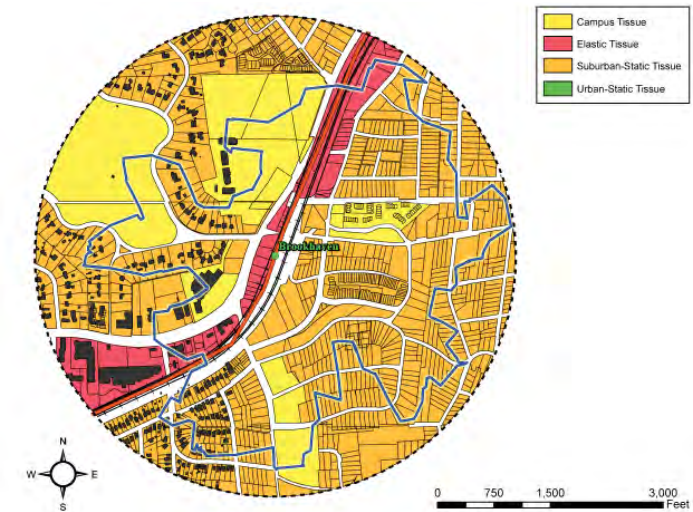
This station cannot currently develop as a TOD without huge amount of infrastructure improvements. My analysis disagrees with MARTA’s findings.



MARTA has classified the Brookhaven-Oglethorpe Station as a Town Center Station. The station is located north of Buckhead, along Peachtree Road between North Druid Hills Road and Dresden Drive. Oglethorpe University is located a mile north of the station. Commercial and residential uses comprise approximately 80% of the land uses within a half mile of the station. There are approximately 2,934 people within a half mile and 4,838 jobs within a mile of the station. MARTA owns 10 acres of commuter parking lots immediately adjacent to the station. MARTA has identified these areas as potential TOD opportunities (Metropolitan Atlanta Regional Tranist Authority 2012).

The surrounding urban morphology is suburban static, campus, and elastic tissues. The street structure is a hierarchal system of large blocks and curvilinear streets. Several large parking lots disconnect the station from the neighborhood. Any foot traffic from the station or

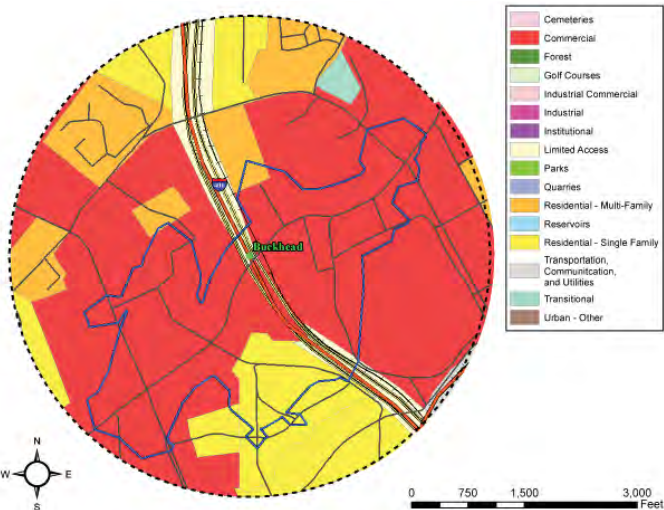
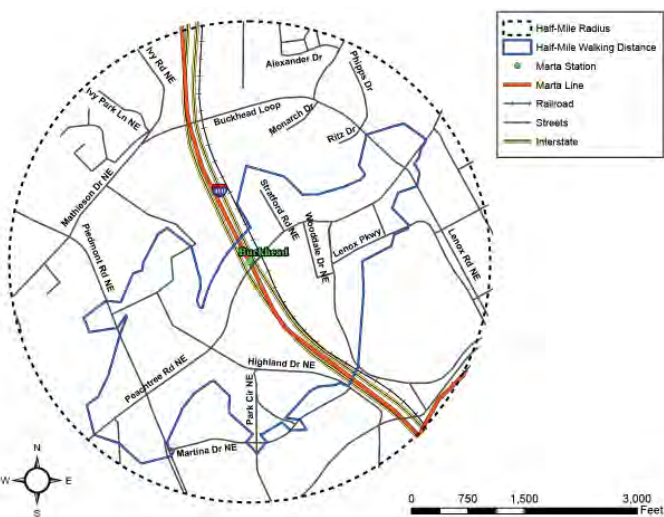
| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 2,494 | - |
| Population | 2,934 | 1,434 |
| Employment | 4,838 | 294 |
| Linear Ft. of ROW | - | 38,248 |



BUCKHEAD STATION

MARTA has identified the Buckhead Station as an Urban Core Station. The station is located in the median right-of-way of Georgia 400, a limited access freeway. The station has two entrances, one on either side of Peachtree Street, where the street crosses over the highway. A mix of commercial and residential uses surrounds the station. Office and retail complexes dominate the commercial areas. There are two regional shopping centers, Phipps Plaza and Lenox Mall, within a half from the station. There are approximately 3,331 people within a half mile and 56,404 jobs within a mile of the station. Since MARTA does not own any land nearby and because of the unique location, there are very little opportunities for TOD development, however MARTA encourages any nearby development to be transit friendly (Metropolitan Atlanta Regional Tranist Authority 2012).

The surrounding urban morphology is mostly campus tissue with small patches of suburban static. The station is located in an urban environment that is dominated by high-rise office parks. The street structure consists of roads that serve the office parks, which connect to a six-lane Peachtree Road. As a result, the walking environment is non-existent except along Peachtree Street. The station is uniquely located within a right-of-way, which severely limits the options for TOD development. The lack of available land also provides few opportunities for growth.



The unique location of the station and the surrounding morphology means that this station could not currently develop as a TOD without huge amount of infrastructure improvements. My analysis disagrees with MARTA's findings.

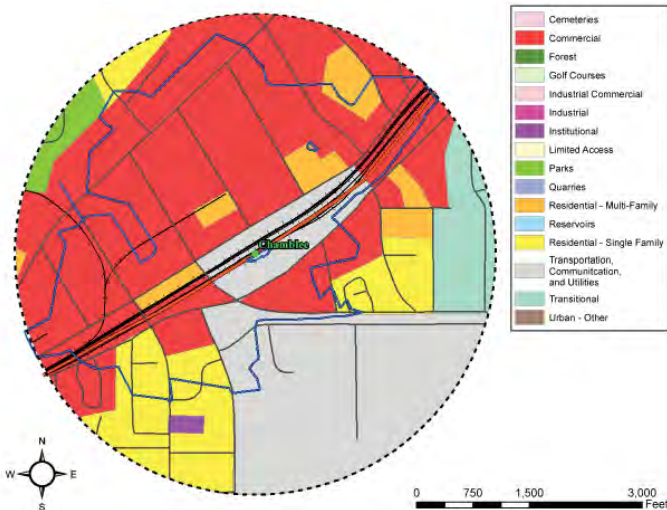
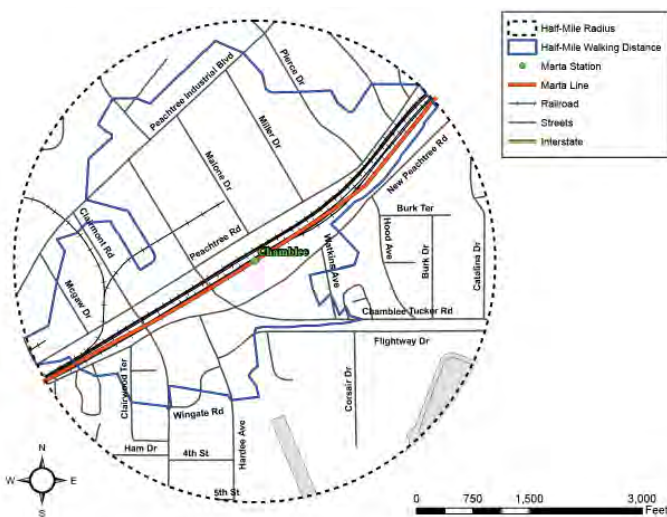


CHAMBLEE STATION

Authority 2012).

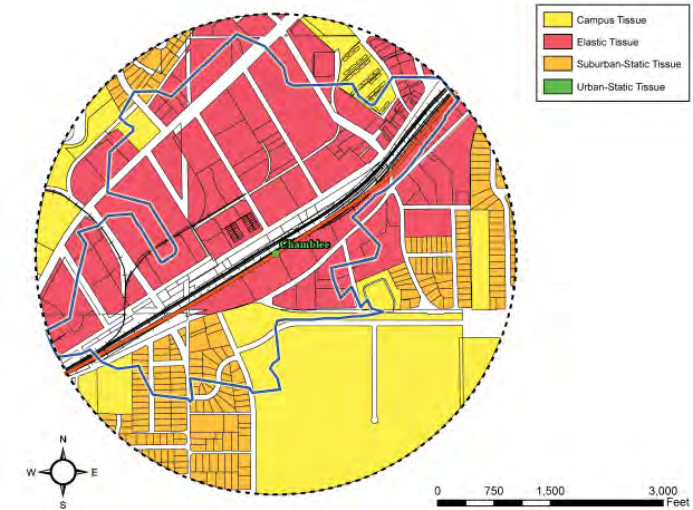
The surrounding urban morphology is a mix of campus, elastic, and suburban tissue. The station is bordered by a Norfolk Southern railroad line to the northeast; however, the station has entrances on both sides of the tracks. The street structure is a combination of dendritic streets to the south and a grid system with long blocks to the north. The area to the south is within a height restriction zone of Peachtree-DeKalb Airport, restricting developing. The area to the north is a redeveloping industrial area, which provides many TOD opportunities, but the elastic tissue in the area make it difficult to create a cohesive and organized street system.

While this area is designated as a Livable Center and is currently undergoing redevelopment, the station currently cannot support successful TODs without a huge amount of infrastructure improvements. My analysis disagrees with MARTA.



Chamblee is classified as a Commuter Town Center station. The station is located in the City of Chamblee's Mid-City district, on the corners of Peachtree Road, New Peachtree Road, and Chamblee-Tucker Road. The land use to the north of the station is dominated by commercial and mix-use and to the south, Peachtree-DeKalb airport. There are approximately 3,177 people within a half-mile and 6,978 jobs within a mile of the station. At the time the station was built, it was the end-of-the-line for the northwest line and parking lots were built to serve commuting riders. Since then, the line has expanded and the need for parking has decreased, as a result, three lots are currently unused. The station was the focus of the Atlanta Regional Commission (ARC) Livable Center Initiative (LCI) study. The LCI study promotes mixed-use and TOD development near or around the station. MARTA has identified these lots as potential opportunities for TOD development that could connect into the Mid-City district (Metropolitan Atlanta Regional Tranist

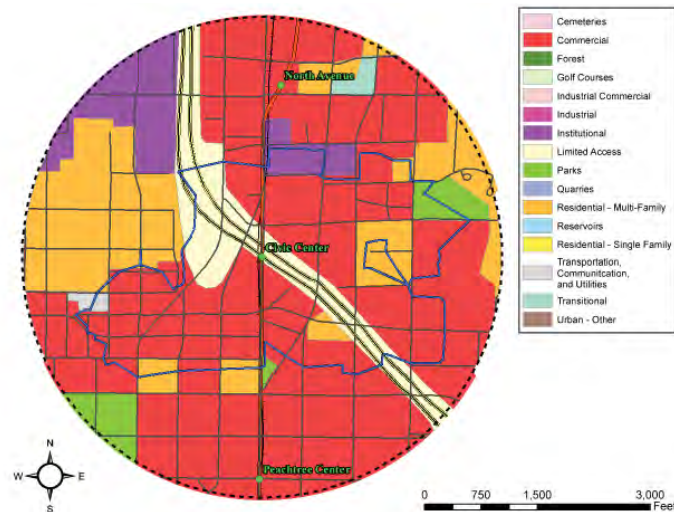
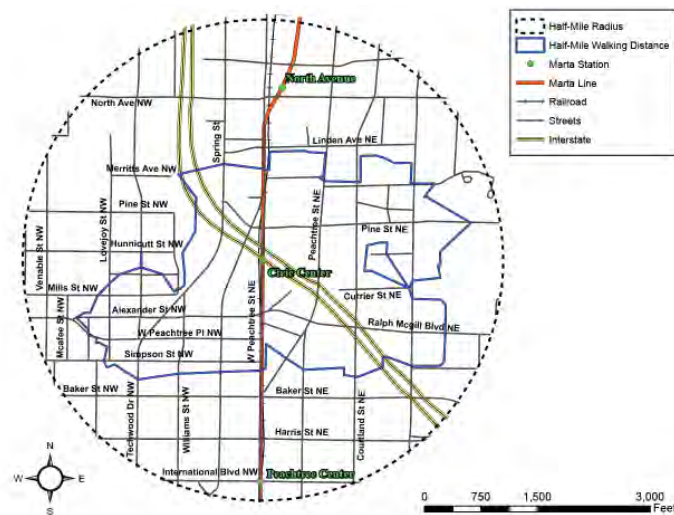
| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 2,354 | - |
| Population | 3,331 | 1,062 |
| Employment | 56,404 | 6,830 |
| Linear Ft. of ROW | - | 18,212 |



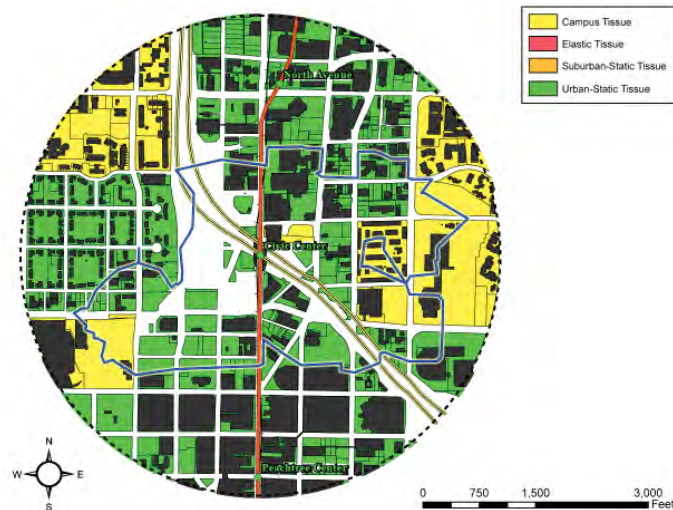
CIVIC CENTER STATION

MARTA has identified Civic Center Station as an Urban Core station. The station is located on West Peachtree Street, as it bridges over Interstate 75/85 (Downtown Connector), between Downtown and Midtown Atlanta. The surrounding land use is mostly commercial and residential. Commercial makes up about 61%, dominated by office space and supplemental retail, while residential is about 19%, mostly comprised of high-density student housing. There are approximately 6,360 people within a half-mile and 103,831 jobs within a mile of the station. MARTA does not own any land surrounding the stations, so it cannot directly develop the area as TODs, but does encourage any adjacent, private development to be transit friendly (Metropolitan Atlanta Regional Transit Authority 2012).

The surrounding urban morphology is urban static tissue. The street structure is primarily gridded streets and small blocks; however, the Downtown Connector passes through the middle of the service area disrupting the existing street pattern. The station is located directly above the interstate; combined with the disrupted street system, accessibility to the station is limited. Even with a limited walkable service area, the station still serves about 13,639 jobs and 2,129 residents, providing a strong potential ridership pool for TOD development.



This station exists within an urban area, but the location of the station would require huge infrastructure improvements to connect back into the surrounding area. Therefore, this station currently cannot support TODs. My analysis disagrees with MARTA.



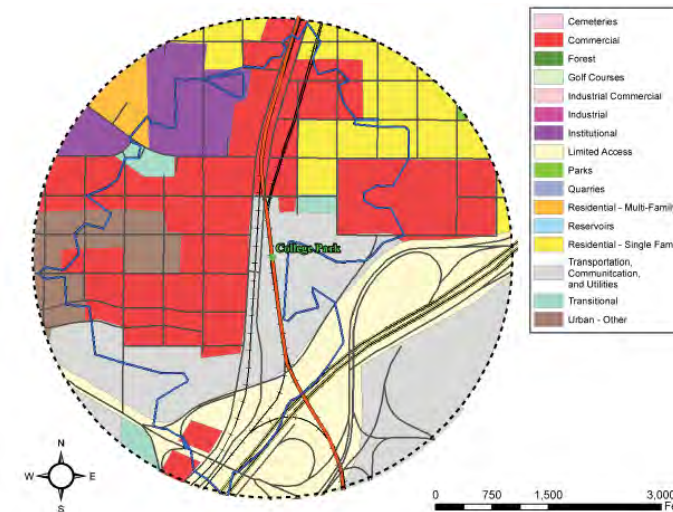
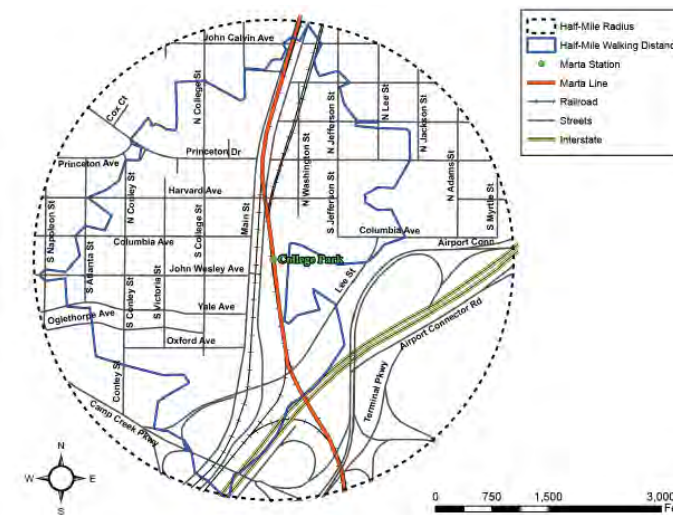
| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 2,722 | - |
| Population | 6,360 | 2,129 |
| Employment | 103,831 | 13,639 |
| Linear Ft. of ROW | - | 33,293 |

COLLEGE PARK STATION

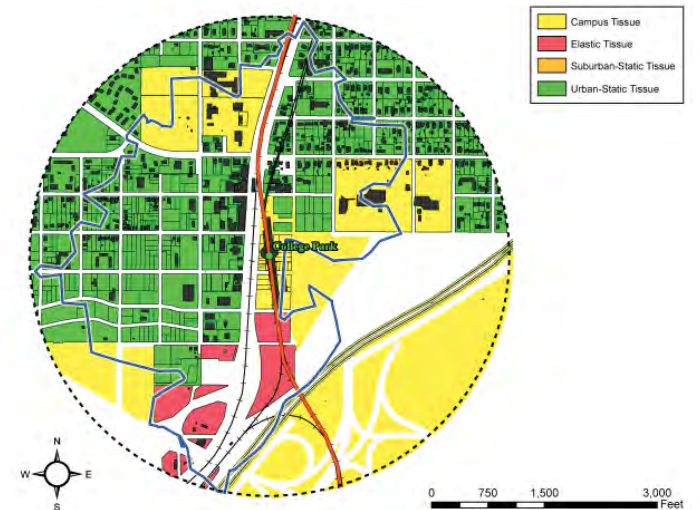
TOD opportunities around the station are extremely limited (Metropolitan Atlanta Regional Transit Authority 2012).

The surrounding urban morphology around the station is a mix between urban static and campus tissue. The street system to the west and north of the station is comprised of gridded streets and small blocks. However, the area to the west is separated from the station by the CSX railroad line and the area to the north is separated from the station by large commuter lots. These barriers limit access to the station by foot. There are several vacant lots and large commuters lots in the area that provide potential TOD opportunities, however, proximity to the airport and MARTA's parking requirement, extremely limits any kind of development east of the station. This station could support TODs to the west with little infrastructure improvements, but the CSX railroad line disconnects it from the station. Parking lots to the east of the station would require huge amount of infrastructure improvements to support TODs, but restrictions imposed upon the sites, virtually guarantees that they will never develop as TODs.

As it currently exists, this station cannot support TODs without huge improvements to infrastructure and connections into the surrounding area. My analysis agrees with MARTA.



College Park Station is classified as a Commuter Town Center. The station is located in the City of College Point, on the corner of the East Main Street and Howard Avenue. It is located north of Interstate 85 from Hartsfield-Jackson International Airport. The land use around the station is mostly transportation and commercial uses. Transportation, comprised of limited access and TCU use, makes up 44% and commercial use makes up about 30%. Residential use makes up a relatively small portion at 12%. There are approximately 1,536 people within a half mile and 3,771 jobs within a mile of the station. The ARC LCI study identified College Park as an area of focus to promote mixed-use and TOD development. MARTA owns several large parking lots around the station, which operate at an average 98% capacity daily. If development were to occur, MARTA would require the lots to be replaced by parking garages. Proximity to the airport further restricts development because of the height restriction zone around the runways. Due to the restrictions,



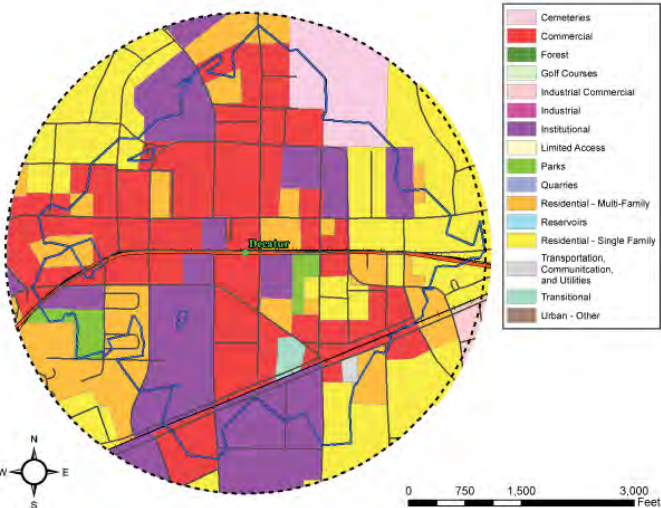
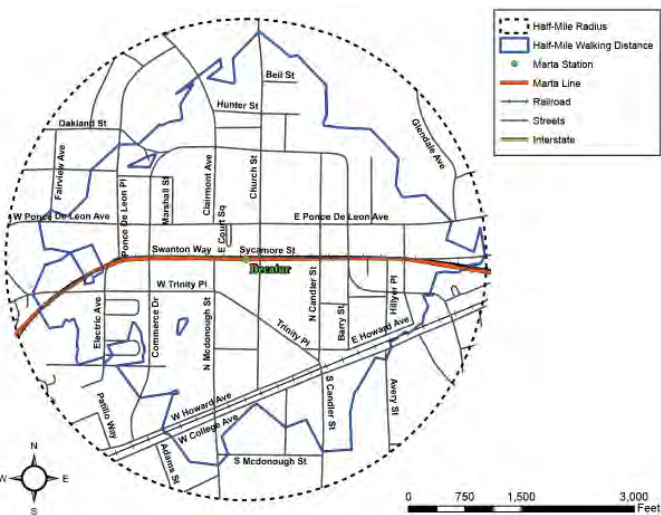
| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 9,271 | - |
| Population | 1,536 | 926 |
| Employment | 3,771 | 450 |
| Linear Ft. of ROW | - | 45,056 |

DECATUR STATION

Decatur is classified as a Town Center station. The station is located in Downtown Decatur on the corner of Church Street and Sycamore Street. The surrounding land use is primarily residential, commercial, and institutional. Residential makes up roughly 40%, comprised by a mix of multi and single family homes. Commercial makes up roughly 30%, with over 200 storefronts located within a half-mile of the station. There are approximately 4,684 people within a half mile and 11,595 jobs within a mile of the station. An ARC LCI study identified Decatur as a Livable Center and confirmed that high development built around transit can be economically successful without sacrificing quality of life. MARTA does not own any land surrounding the stations, so it cannot directly develop the area as TODs, but does encourage any adjacent, private development to be transit friendly (Metropolitan Atlanta Regional Tranist Authority 2012). MARTA considers existing developments around the station as a success.

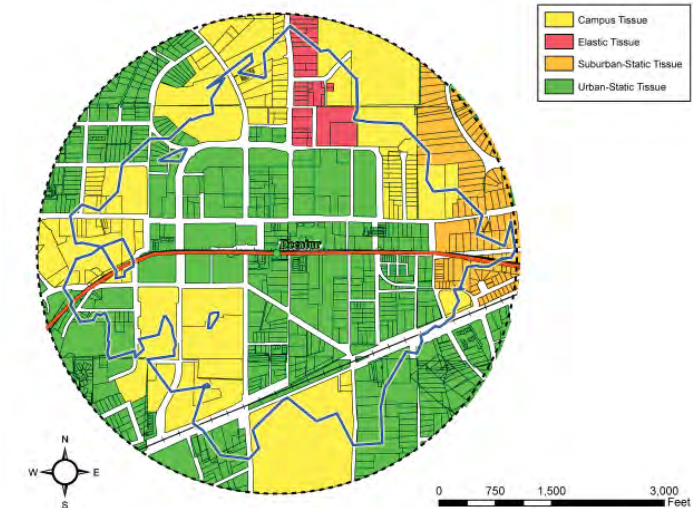
The surrounding morphology consists of urban static, suburban static, elastic, and campus tissues. The street system contains gridded streets and small walkable blocks. The station is located in Downtown Decatur on the town square. There is a vibrant street life with a good mix of uses. Even though this station was not planned, it is the only station within the MARTA system that functions as a

| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 4,466 | - |
| Population | 4,684 | 2,016 |
| Employment | 11,595 | 3,621 |
| Linear Ft. of ROW | - | 51,300 |



TOD that is consistent with the definitions and principles of Peter Calthorpe. Several underutilized parcels provide infill opportunities that could be used to increase density within the service area.

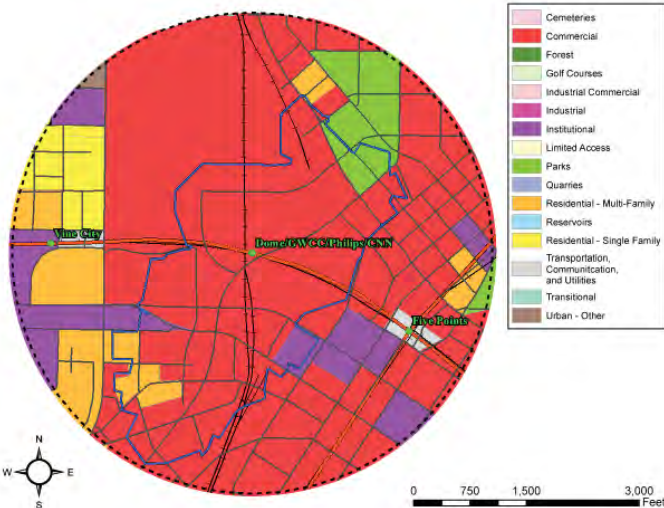
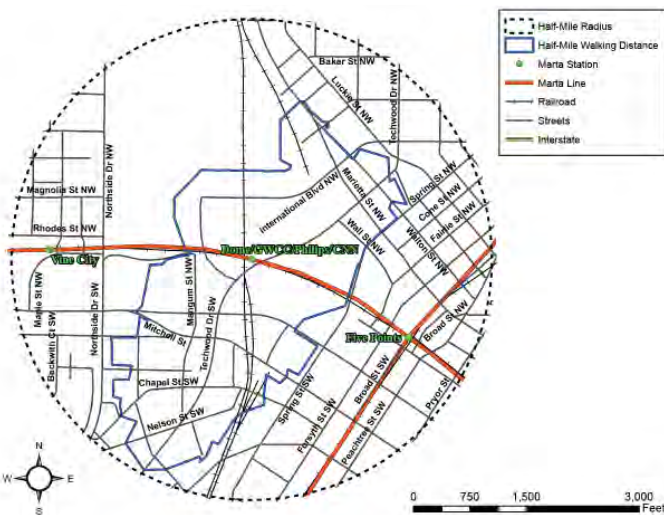
This station already functions similar to a TOD and can support further TOD growth with little infrastructure improvements. My analysis agrees with MARTA's findings.



DOME/GWCC STATION

urban setting; large facilities to the north create superblocks, essentially destroying the street system. The area to the south has a functional street system, but the streets are lined with vacant parcels that create an inhospitable walking experience. The proposed Multi-Modal Passenger Terminal (MMPT) is planned on the vacant parcel immediately south of the station. With the areas to the north unlikely to change for a very long time, the only opportunities for development would be south of the MMPT.

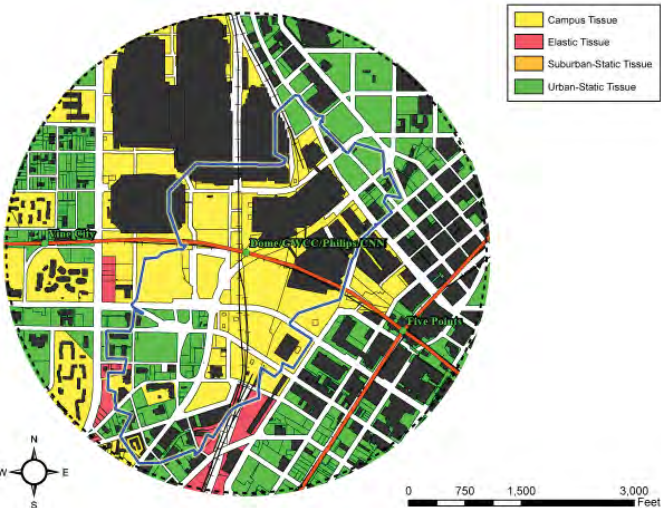
As it currently exists, this station cannot support TODs without huge infrastructure improvements. My analysis disagrees with MARTA's analysis.



MARTA has classified the Dome/GWCC/Phillips Arena/CNN Center station as a special regional destination. The station is located in Downtown Atlanta at the foot of the Georgia Dome and Phillips Arena. Several major attractions are within walking access from the station, including the CNN Center, Georgia World Congress Center, Centennial Olympic Park, Georgia Aquarium, and the World of Coca-Cola. The surrounding land use is dominated by commercial, which makes up roughly 72%. There are approximately 1,927 people within a half mile and 114,164 jobs within a mile of the station. MARTA does not own any land surrounding the stations, so it cannot directly develop the area as TODs, but does encourage any adjacent, private development to be transit friendly (Metropolitan Atlanta Regional Tranist Authority 2012).

The surrounding urban morphology is a mix of urban static, elastic, and campus tissue. The station is located in an

| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 2,371 | - |
| Population | 1,927 | 1,509 |
| Employment | 114,164 | 5,938 |
| Linear Ft. of ROW | - | 23,296 |

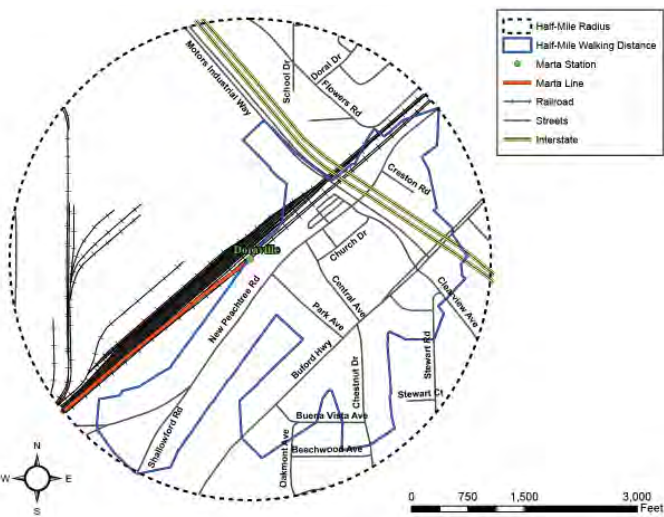


DORAVILLE STATION

The Doraville Station is classified as a Commuter Town Center. The station is located at the northern edge of DeKalb County, within the City of Doraville. It is at the end of the line is primarily a park-and-ride station. The land use is mostly commercial and industrial. The commercial use makes up about 43% and industrial, mostly the former GM plant to the west of the station, makes up about 37%. There are approximately 3,254 people within a half-mile and 6,543 jobs within one mile of the station. MARTA owns several parking lots around the station, but because it is at the end of the line, any adjacent development would need to replace the parking one for one. Therefore, any TOD opportunities on MARTA property would be extremely limited. However, in 2011, the City of Doraville approved an LCI plan, which targets the old GM site and the town center as areas for redevelopment (Metropolitan Atlanta Regional Transit Authority 2012).

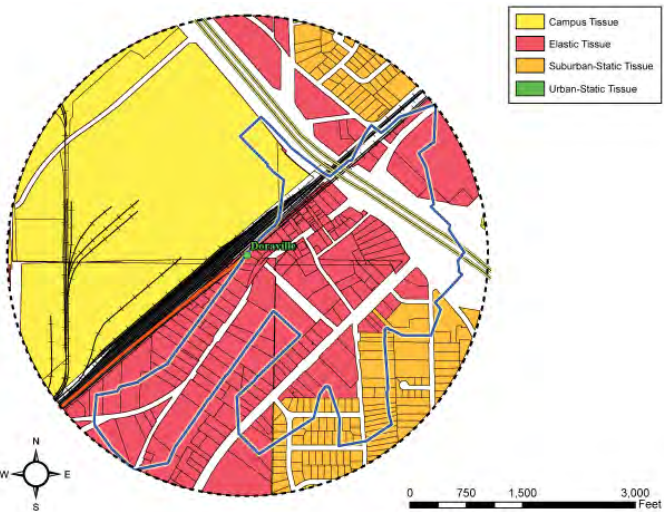
The morphology surrounding the station is a mix of campus, suburban static, and elastic tissue. The street structure consists of two parallel streets that have few connections between them. The area is dominated by strip development designed for automobile access, which creates an inhospitable and unsafe walking environment. The former GM site is separated from the site by the Norfolk Southern railroad line and does not connect to the station. There are

| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 5,403 | - |
| Population | 3,254 | 747 |
| Employment | 6,543 | 924 |
| Linear Ft. of ROW | - | 23,328 |



plenty of development opportunities around the station, but the morphological structure in the area makes it extremely difficult for any organized growth to happen.

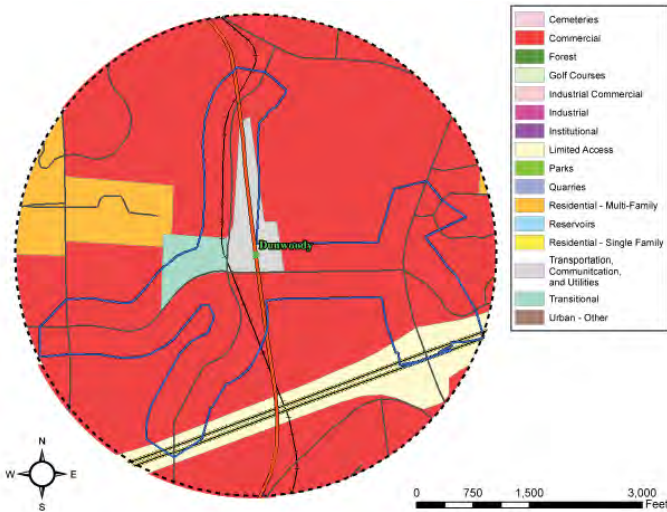
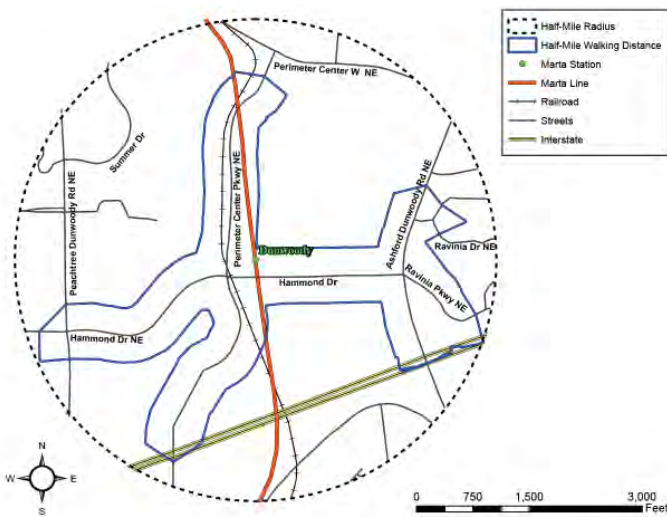
This station currently cannot support TOD growth. Huge amounts of infrastructure improvements are required to the south and the area to the west lacks any sufficient infrastructure, requiring it to develop as a “new town.” My analysis disagrees with MARTA’s findings.



DUNWOODY STATION

residents or jobs within walking distance to the station. The lack of a sufficient street system makes it difficult for any organized development to occur. Any development would need to develop as a “new town.”

This station cannot currently support TOD growth because of the lack of proper infrastructure. My analysis disagrees with MARTA findings.



MARTA has classified the Dunwoody Station as a Town Center. The station is located in the City of Dunwoody on the corner of Perimeter Center Parkway and Hammond Drive. Adjacent to the station is the second largest shopping mall in Georgia, Perimeter Mall. Commercial makes up 81% of the surrounding land use. There are 792 people within a half-mile and 47,927 jobs within one mile of the station. MARTA owns very little property around the station, roughly 4 acres, which currently contains a parking structure. Therefore, limited TOD development opportunities exist on MARTA property. However, MARTA encourages any private development around the station to be transit-friendly (Metropolitan Atlanta Regional Transit Authority 2012).

The urban morphology around the station is dominated by campus tissue. There is essentially no street structure because of the shopping malls. The area is designed specifically for automobile access. There are virtually no

| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 3,399 | - |
| Population | 792 | 807 |
| Employment | 47,927 | 4,572 |
| Linear Ft. of ROW | - | 13,147 |



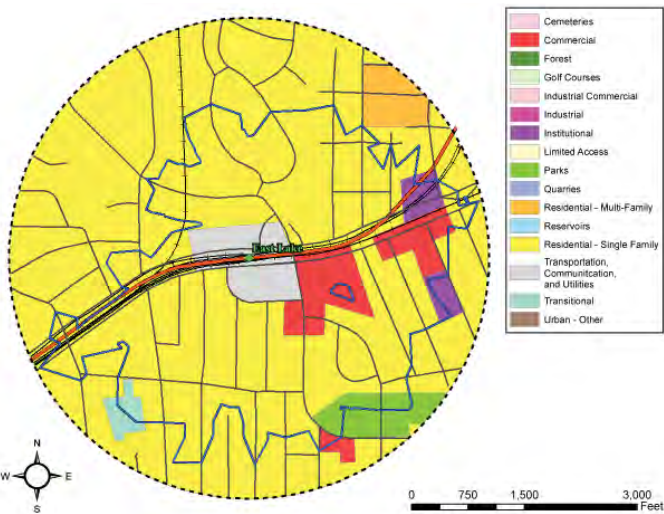
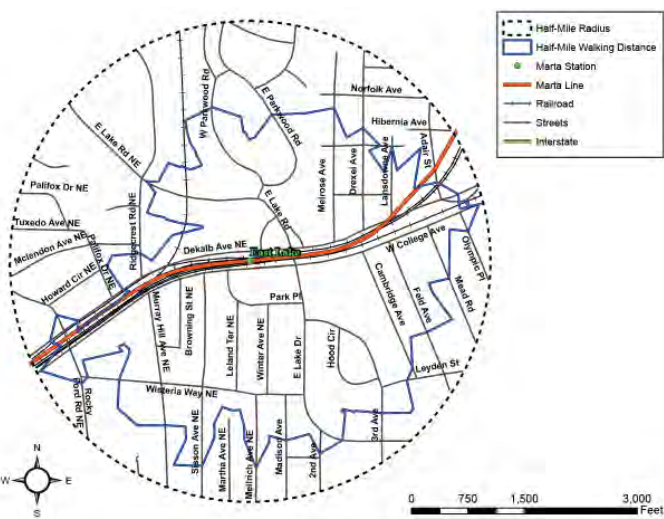
EAST LAKE STATION

East Lake Station is classified as a Neighborhood station. The station is located on the border between the cities of Atlanta and Decatur. It is located along an existing CSX railroad right-of-way and is adjacent to the neighborhoods of Adair Park, Kirkwood, Lake Claire, and Oakhurst, with Oakhurst being the closest to the station. Residential uses make up about 87% of the surrounding land use. There are approximately 3,498 people within a half-mile and 3,140 jobs within one mile of the station. MARTA owns two surface lots, one on either side of the station, which it has identified as areas for potential TOD development (Metropolitan Atlanta Regional Tranist Authority 2012).

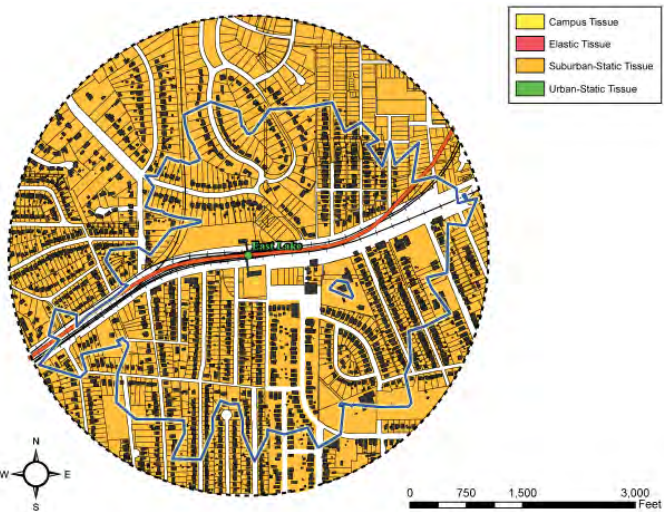
The existing urban morphology is composed entirely of suburban static tissue. The street system is consists of curvilinear streets, long blocks, and dead end streets. The station area is split in half by the CSX railroad line, which disconnects the northern area from the southern area. The station flanked by two surface parking lots, which further inhibits walking access. The area is within an established residential area that is unlikely to change over time.

Currently, this station could not develop as a TOD without huge amount of infrastructure improvements. Even if TOD development did occur, it may never become successful because of the established nature of the surrounding location.

| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 1,101 | - |
| Population | 3,498 | 1,807 |
| Employment | 3,140 | 712 |
| Linear Ft. of ROW | - | 40,652 |



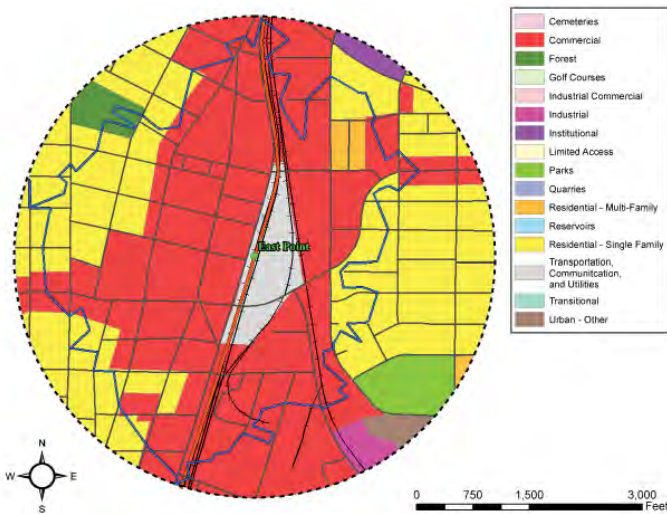
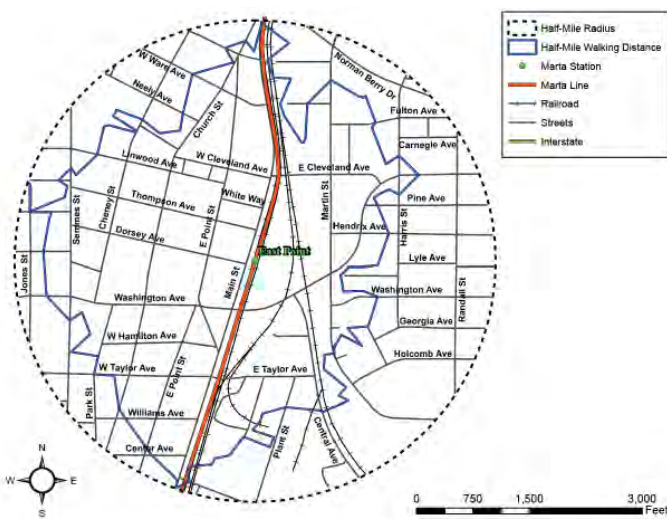
My analysis disagrees with MARTA's findings.



EAST POINT STATION

pedestrian bridge spans the railroad track, narrow sidewalks, vacant land, parking lots, and a five lane arterial road create an uninviting and unsafe walking environment. The western half of the site is comprised of gridded streets and small blocks, setting the framework for a walkable environment, but the blocks adjacent to the station are dominated by disconnected development. Each parcel has its own building and parking lot, inconsistent with that of a town center.

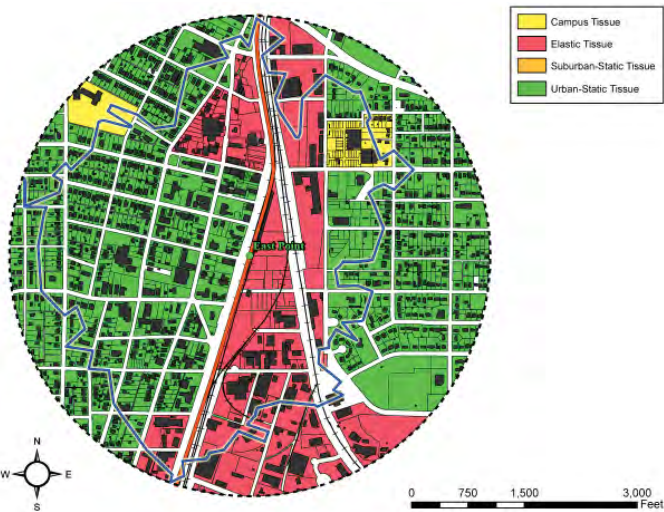
As it currently exists, this station cannot support TODs without huge infrastructure improvements. My analysis disagrees with MARTA's findings.



MARTA has indentified the East Point Station as a town center station. East Point is located south of Atlanta. The surrounding half-mile radius contains approximately 2,700 residents and has a daily entry rate of 5,150. The surrounding land use is dominated by commercial and residential uses. Commercial makes up about 52% and ranges from small storefronts to light industrial uses. Residential makes up about 38%, ranging from low-density, single family homes to medium density, multi-family developments. Two large parking lots are located along the east side of the station, presenting opportunities for TOD development, but re-zoning and parking relocation must precede any development (Metropolitan Atlanta Regional Tranist Authority 2012).

The urban morphology surrounding the East Point Station is a collection of campus, urban static, and elastic tissues. A railroad track borders the eastern edge of the station dividing the walking area into two halves. Even though a

| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 5,150 | - |
| Population | 2,753 | 1,575 |
| Employment | 6,751 | 708 |
| Linear Ft. of ROW | - | 50,842 |



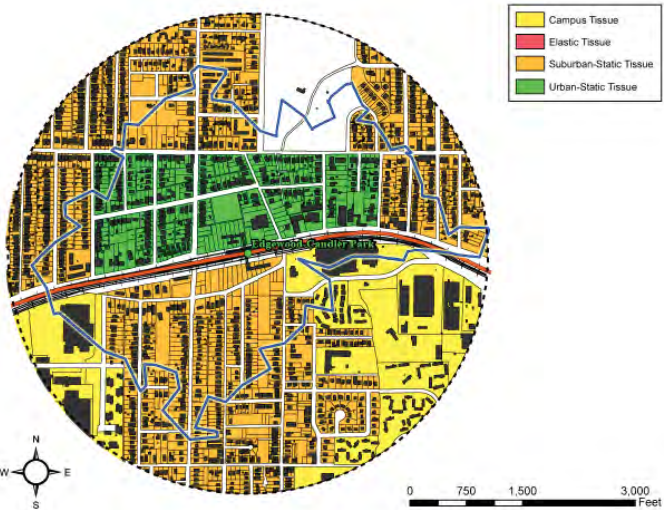
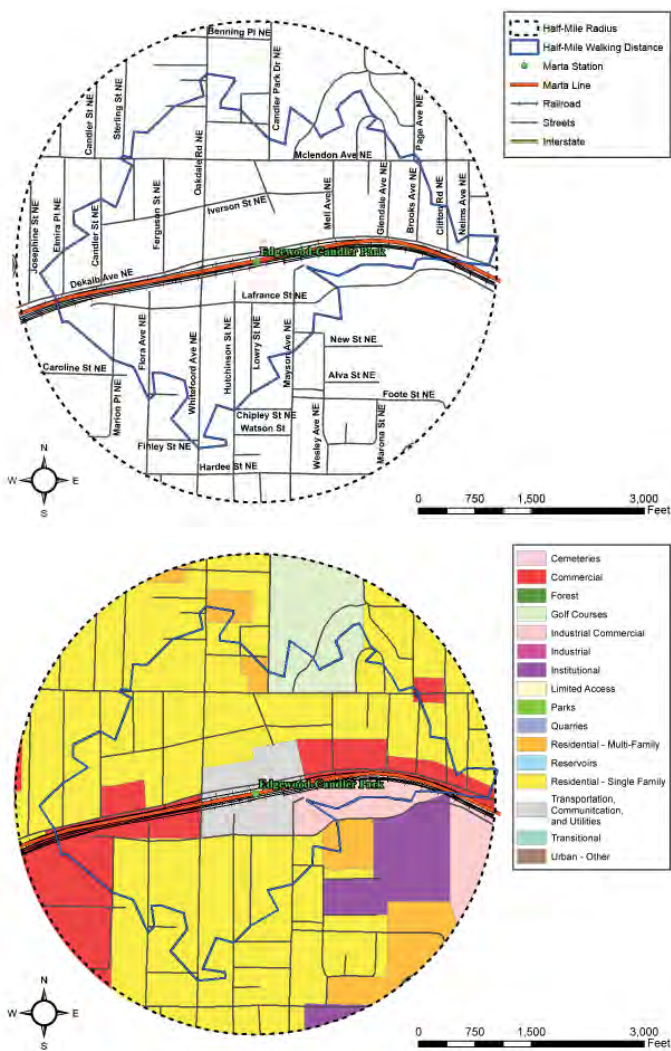
EDGEWOOD STATION

The Edgewood/Chandler Park Station is classified as a Neighborhood station. The station is located on the corner of DeKalb Avenue and Oakdale Road. Residential makes up about 67% of the surrounding land use. Most of the residential area is comprised of single-family homes. There are about 5,165 homes within a half-mile and 4,080 jobs within one mile of the station. MARTA owns two surface lots, one on either side of the station, which it has identified as areas for potential TOD development. The south lot is favored over the north lot because of the availability of more developable space (Metropolitan Atlanta Regional Transit Authority 2012).

The surrounding urban morphology consists of campus, urban static, and suburban static tissues. The station area is divided in half by the CSX railroad line and acts as a barrier between the two halves of the station area. Large parking lots flank the station, which further disconnects the station from the surrounding neighborhoods. The parking lots offer TOD opportunities immediately adjacent to the station; however there is no supporting infrastructure within those areas.

As it currently exists, this station cannot support TODs without huge infrastructure improvements. My analysis disagrees with MARTA's findings.

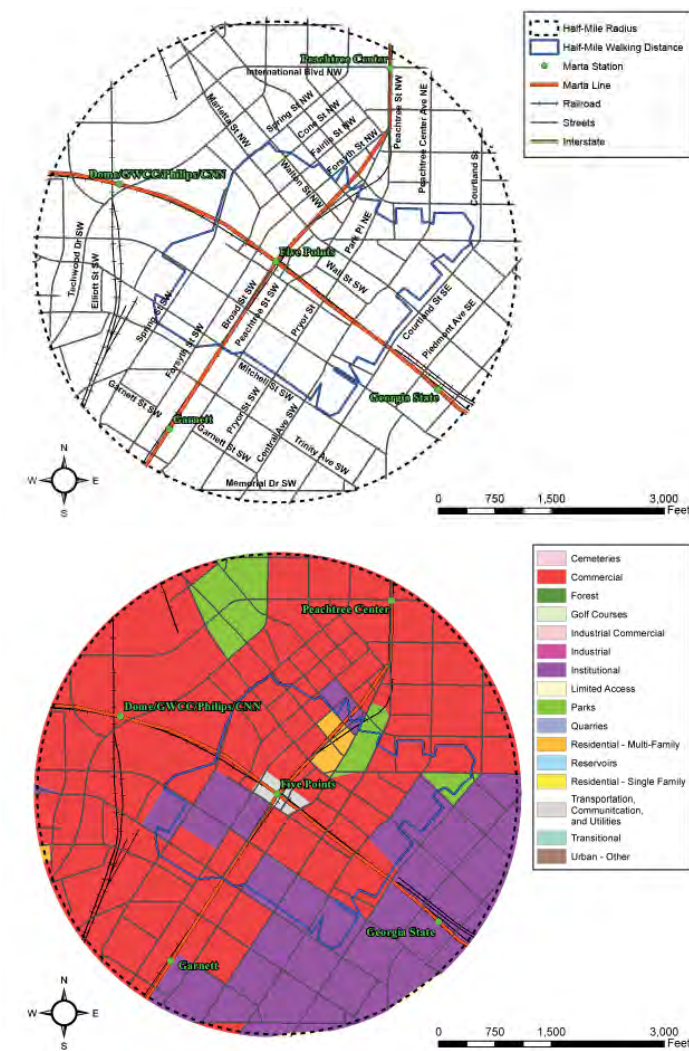
| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 1,314 | - |
| Population | 5,165 | 2,082 |
| Employment | 4,080 | 396 |
| Linear Ft. of ROW | - | 33,802 |



FIVE POINTS STATION

gridded street system with small walkable blocks. This station is located less than a half-mile from four other stations, therefore the service area is not quite as large as MARTA describes. There are few opportunities for TOD growth, but the station is within a dense urban environment, so when an opportunity arises, TODs could develop with ease.

As it currently exists, this station can support TODs with very little infrastructure improvements. My analysis agrees with MARTA's findings.



MARTA has identified the Five Points Station as an urban core station. The station is located in the heart of Downtown Atlanta and is located adjacent to Underground Atlanta. Five Points is the busiest station within MARTA and serves as the only transfer point between the east-west and north-south lines. Land use is dominated by commercial and institutional uses. Commercial uses, dominated by office space and supplemental retail, makes up about 66%, while institutional makes up about 28%. There are about 4,571 people within a half-mile and 111,775 jobs within one mile of the station. MARTA does not own any land surrounding the station, so it cannot directly develop the area as a TOD, but does encourage any adjacent, private development to be transit friendly (Metropolitan Atlanta Regional Transit Authority 2012).

The surrounding urban morphology is comprised of urban static and campus tissues. The street system is a

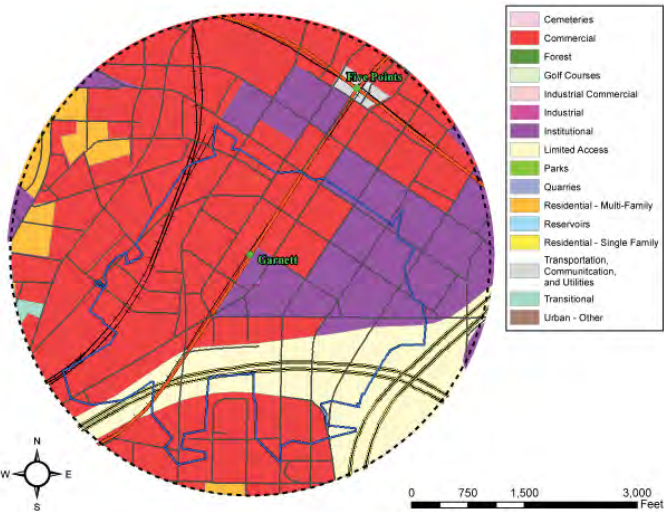
| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 22,821 | - |
| Population | 4,571 | 1,203 |
| Employment | 111,775 | 31,821 |
| Linear Ft. of ROW | - | 27,594 |



GARNETT STATION

MARTA has classified Garnett Station as an Urban Core station. It is located in Downtown Atlanta on the corner of Brotherton Street and Peachtree Street. The surrounding land use is mostly commercial and institutional. Commercial makes up about 62% and institutional makes up about 19% of the area. There are approximately 4,757 people within a half-mile and 102,988 jobs within one mile of the station. MARTA does not own any land surrounding the station, so it cannot directly develop the area as a TOD. However, its proximity to the Central Business District and Government District, offers significant opportunities for redevelopment. MARTA encourages any adjacent, private development to be transit friendly (Metropolitan Atlanta Regional Tranist Authority 2012).

The surrounding urban morphology made up of urban static, elastic, and campus tissues. The street system is gridded with small blocks. The Norfolk Southern railroad track to the west and Interstate 20 to the south frame the site, which limits the walking network around the station. This station is located in a neglected, underdeveloped portion of downtown Atlanta, so there are numerous TOD opportunities around the station. The existing urban environment provides the framework needed for TOD growth.



As it currently exists, this station can support TODs

| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 1,797 | - |
| Population | 4,757 | 1,455 |
| Employment | 102,988 | 13,047 |
| Linear Ft. of ROW | - | 33,454 |

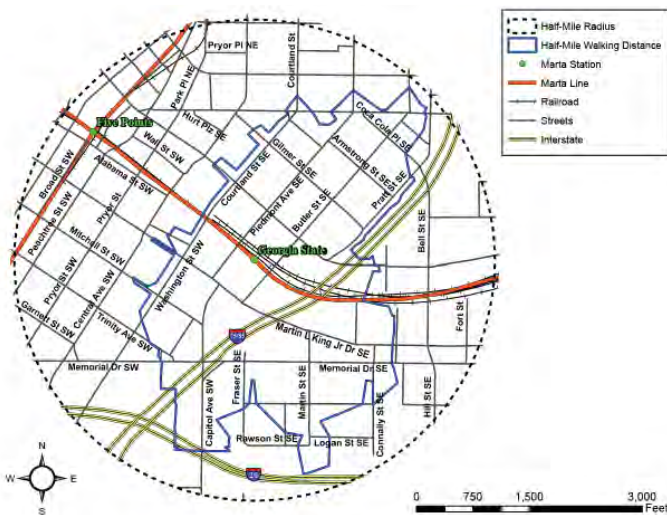
with little infrastructure improvements. My analysis agrees with MARTA's findings.



GEORGIA STATE STATION

small blocks. The Downtown Connector borders the station immediately to the south, disrupting the street system and limiting the walkability around the station. In addition, the station is within a half-mile of two stations, which further limits the service area. The station is within the campus of Georgia State, which would have influence over any potential development. However, the urban fabric is conducive for TOD development.

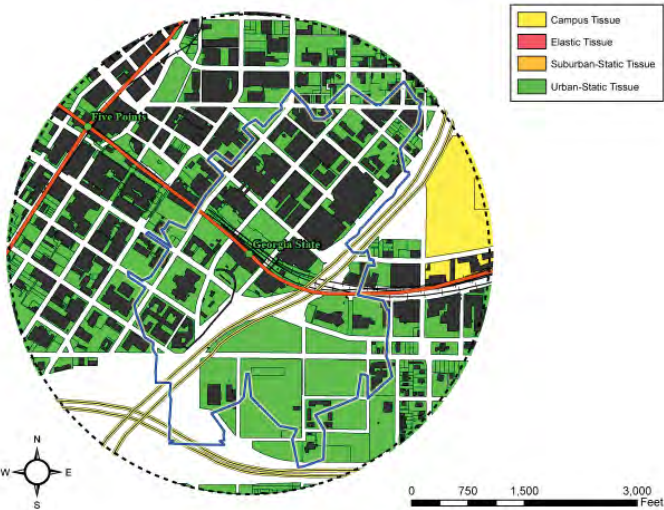
As it currently exists, this station can support TODs with little infrastructure improvements. My analysis agrees with MARTA's findings.



The Georgia State Station is classified as an Urban Core station. The station is located in Downtown Atlanta between Piedmont Avenue, Jesse Hill Jr. Drive, and Decatur Street. It is adjacent to and provides access to Georgia State University. The surrounding land use is primarily composed of institutional and commercial uses. Institutional, a mix of governmental, office, and university buildings, makes up about 33%, while commercial makes up about 28% of the area. There are approximately 6,321 people within a half-mile and 109,906 jobs within one mile of the station. MARTA does not own any land surrounding the station, so it cannot directly develop the area as a TOD, but does encourage any adjacent, private development to be transit friendly (Metropolitan Atlanta Regional Tranist Authority 2012).

The surrounding urban morphology consists of urban static tissue. The street system is a grid structure with

| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 4,650 | - |
| Population | 6,321 | 2,192 |
| Employment | 109,906 | 14,541 |
| Linear Ft. of ROW | - | 32,326 |



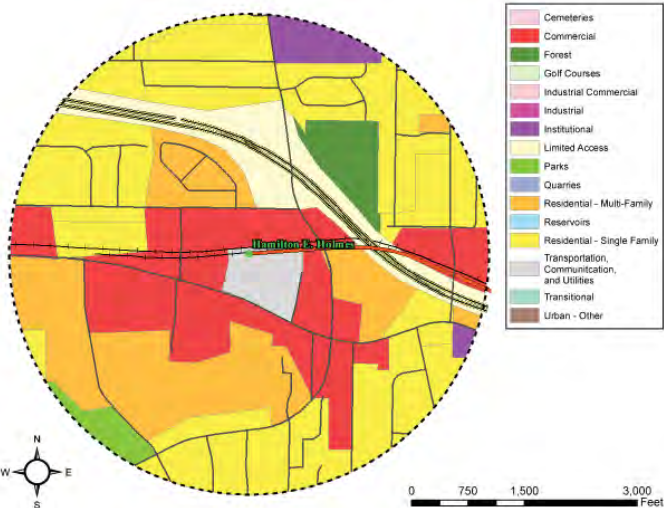
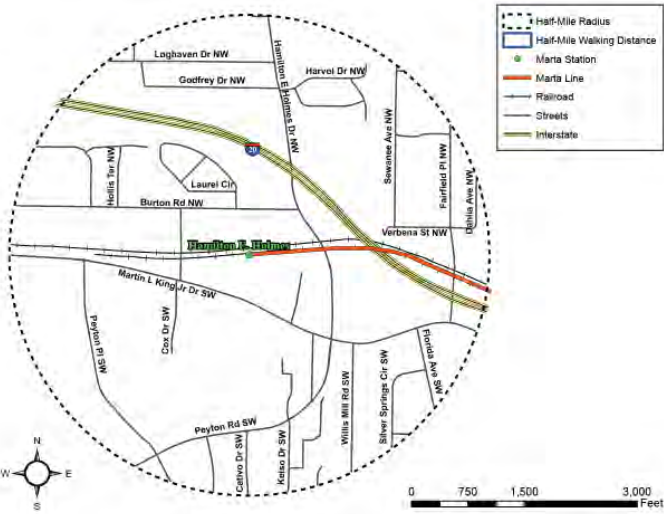
HE HOLMES STATION

MARTA has classified Hamilton E. Holmes Station as a Commuter Town Center. The station is located at the end of the blue line on the corner of HE Holmes Drive and MLK Jr. Drive. Residential makes up roughly 60% and commercial makes up roughly 21% of the surrounding land use. There are approximately 2,852 people within a half-mile and 1,294 jobs within one mile of the station. As mentioned, the station is located at the end of the line, primarily used as a park-and-ride station; therefore, there are several large parking lots to accommodate commuters. MARTA has indentified these lots, approximately 18 acres, as appropriate for TOD development (Metropolitan Atlanta Regional Tranist Authority 2012).

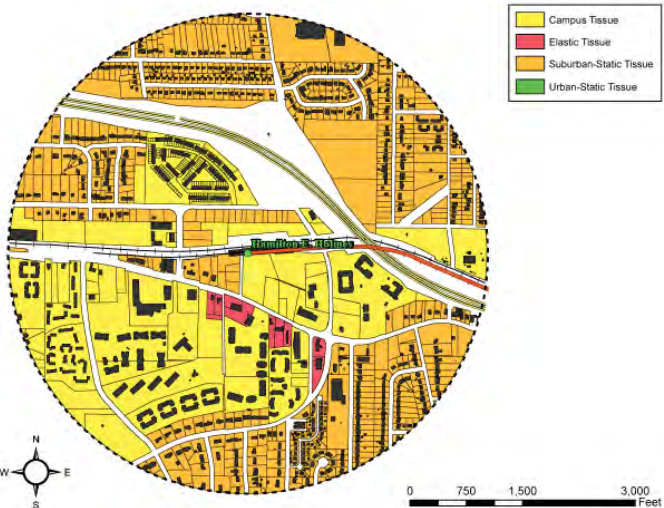
The urban morphology surrounding the station is a mix of suburban static, elastic, and campus tissues. The street structure is a hierarchical system that isolates the station from the surrounding area. Large parking lots surround the station, combined with the existing street structure, make walking to station nearly impossible. The only safe way to access the station is by automobile. If this station were to develop as a TOD as it currently exists, it would require a huge amount of infrastructure improvements and would need to develop as a “new town.”

The station cannot currently support successful TOD development. My analysis disagrees with MARTA’s

| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 6,823 | - |
| Population | 2,852 | - |
| Employment | 1,294 | - |
| Linear Ft. of ROW | - | - |



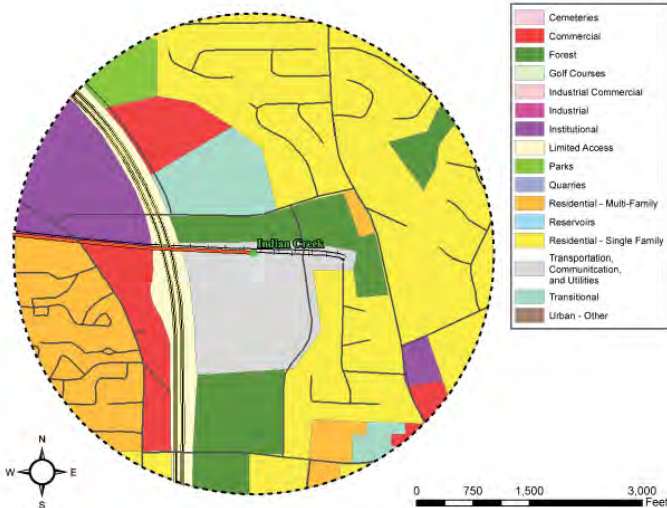
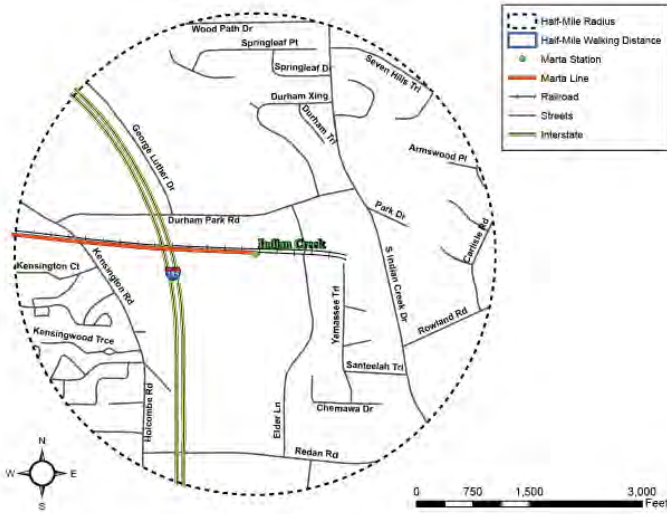
findings.



INDIAN CREEK STATION

half-mile walking boundary exists. The only safe way to access the station, is by automobile. If the station were to develop as a TOD as it currently exists, it would essentially be a “new town” development. The hierarchy of streets isolates the surrounding neighborhoods from the station and any development would not serve the existing population.

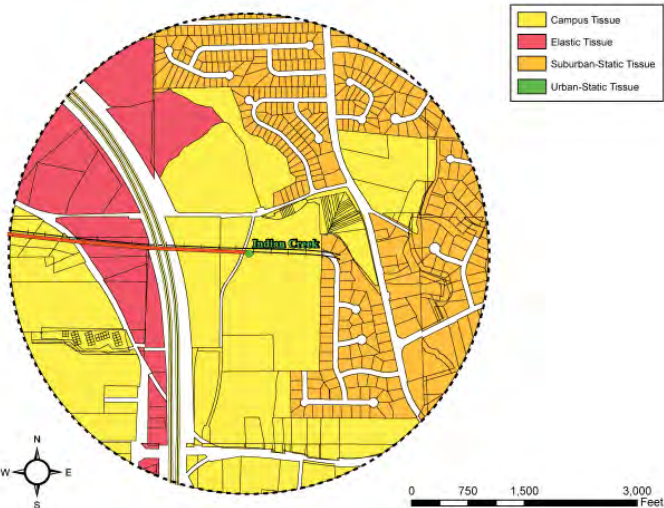
This station, due to the existing street structure and urban tissue, is not appropriate for TOD development. My analysis disagrees with MARTA’s findings.



MARTA has identified Indian Creek Station as a collector station. This station acts a park-and-ride station for the surrounding community. This is reinforced by dedicated on and off ramps from nearby Interstate 285. This station is at the end of the Blue Line, therefore has a large, 2,300 space parking lot. The surrounding land use is approximately 50% low density, single family residential with a population of 885 people. The area is rich in employment with approximately 10,000 jobs within a one-mile radius. MARTA has identified approximately 22 acres surrounding this station as appropriate for TOD development (Metropolitan Atlanta Regional Tranist Authority 2012).

The urban morphology surrounding Indian Creek is a mix of campus, suburban static, and elastic tissues. The station is primarily a park-and-ride station. The large parking lot adjacent to the station and the existing street structure make it impossible to walk to the station, so no

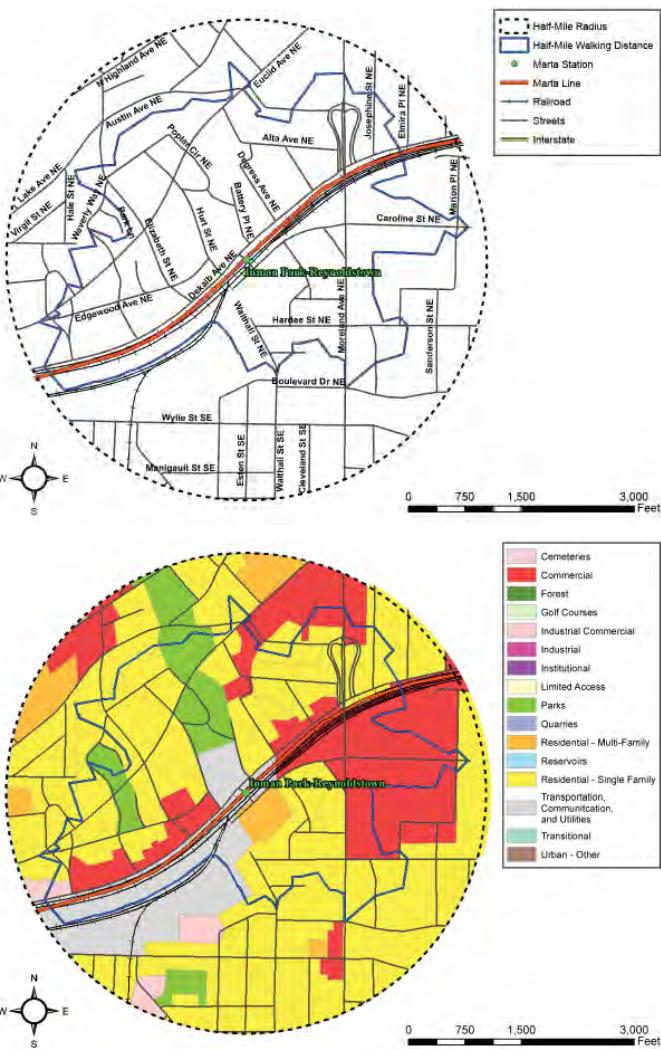
| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 5,781 | - |
| Population | 885 | - |
| Employment | 10,547 | - |
| Linear Ft. of ROW | - | - |



INMAN PARK STATION

MARTA has classified the Inman Park/Reynoldstown Station as a Neighborhood station. The station is located near the Fulton and DeKalb County border on the corner of DeKalb Avenue and Hurt Street, along the CSX rail line and north of the CSX Intermodal rail yard. Residential makes up about 60% and commercial, concentrated along Moreland and DeKalb Avenue, makes up about 21% of the surrounding land use. The Edgewood Retail District is the major commercial hub of the area. There are approximately 5,279 people within a half-mile and 6,627 jobs within one mile of the station. There are three lots surrounding the station, one to the north and two to the south. The north lot is owned by the Georgia Department of Transportation, which provides MARTA with a right of use. Since MARTA does not own the north lot, it has no control over the development of the lot; therefore, it has identified the two southern lots as areas appropriate for TOD development (Metropolitan Atlanta Regional Transit Authority 2012).

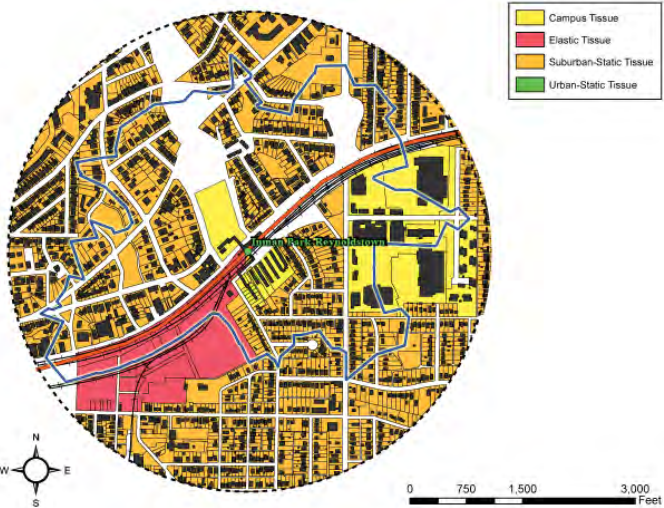
The urban morphology surrounding the station is a mix of suburban static, campus, and elastic tissues. The station is within the established residential neighborhoods of Inman Park and Reynoldstown. The CSX railroad line splits the station area and creating a physical barrier between the two neighborhoods. The neighborhoods essentially act as separate service areas, rather than one. Inman Park to



| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 3,021 | - |
| Population | 5,279 | 2,105 |
| Employment | 6,627 | 447 |
| Linear Ft. of ROW | - | 40,334 |

the north has organic streets with a hierarchical structure. Reynoldstown has an irregular street structure that is disrupted by an apartment complex and the nearby CSX rail yard. As a result, the walking area is small and has few connections. The MARTA parking lots provide an opportunity for the station to develop as a TOD; however, any development would need to address connection issues between the neighborhoods and would require a huge amount of infrastructure improvements.

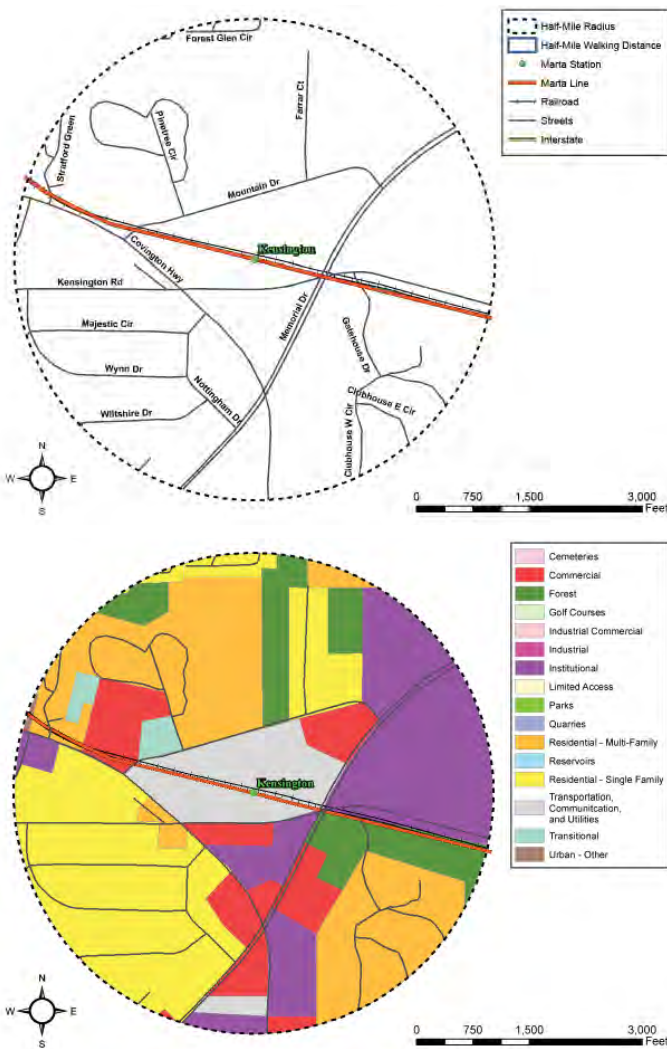
As it currently exists, this station cannot support TOD development. My analysis disagrees with MARTA's findings.



KENSINGTON STATION

suburban static and elastic tissues. The street structure is a hierarchical system consisting of organic streets. The station is not at the end of the line, but it functions as a parking-and-ride station. Large commuter lots surround the station, isolating it from the surrounding area; therefore, no walking distance exists for this station. The parking lots, along with several underutilized parcels, numerous opportunities for TOD growth exists; however, any development would essential act as a “new town,” because of the lack of organized infrastructure in the surrounding area.

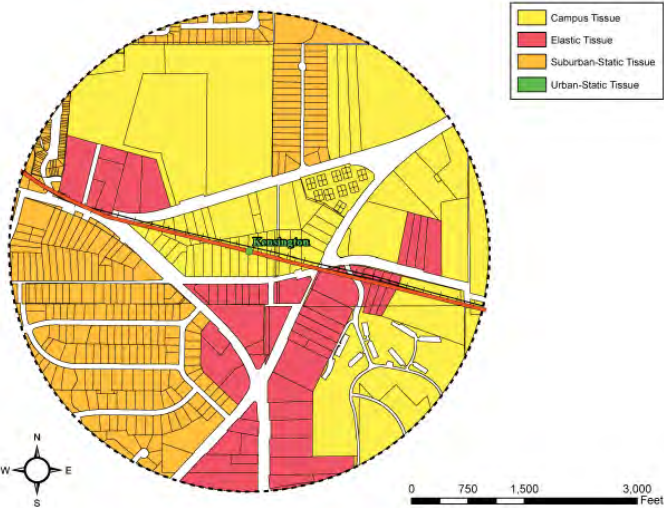
As it currently exists, this station cannot support TODs without major infrastructure investments. My analysis disagrees with MARTA's findings.



MARTA has identified the Kensington Station as a Commuter Town Center. It located in unincorporated DeKalb County at the intersection of Covington Highway and Memorial Drive. Residential makes up roughly 47%, institutional 20%, and commercial 10% of the surrounding land uses. Most of the commercial appears in the form of strip developments. There are approximately 6,344 people within a half-mile and 14,012 jobs within one mile of the station. Kensington was the focus of an ARC LCI study, which recommended a denser pattern of development around the station. The station used to be the end of the line, so there are several large parking lots around the station that are underutilized or longer used. MARTA has identified approximately 20 acres of parking lots and undeveloped areas that are appropriate for TOD development (Metropolitan Atlanta Regional Transit Authority 2012).

The surrounding urban morphology is a mix of

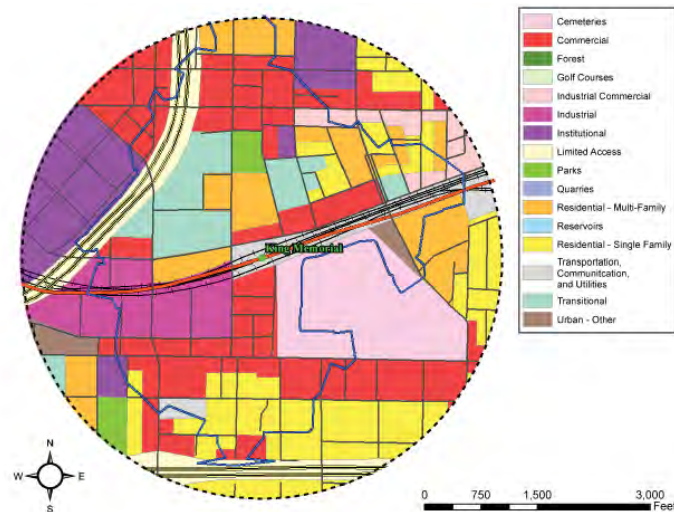
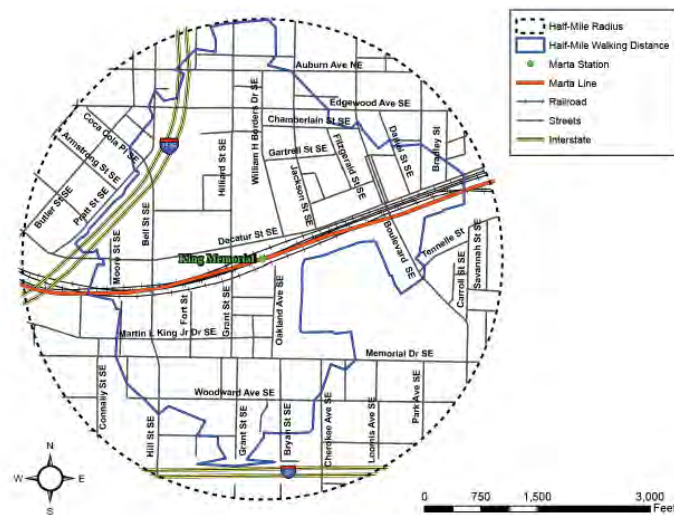
| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 6,848 | - |
| Population | 6,344 | - |
| Employment | 14,012 | - |
| Linear Ft. of ROW | - | - |



KING MEMORIAL STATION

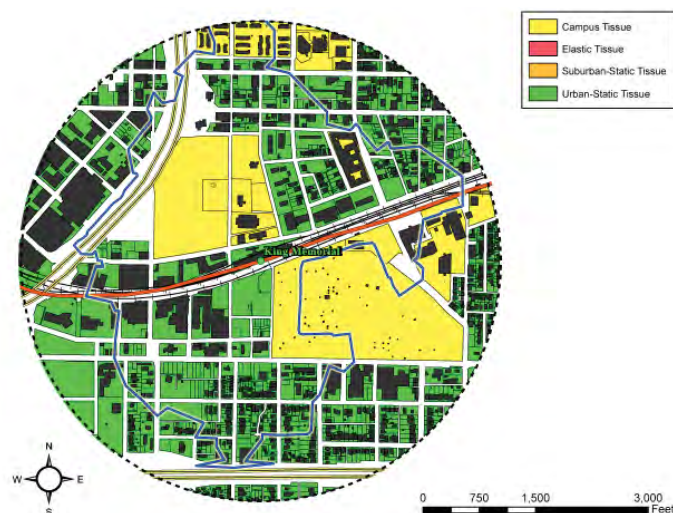
MARTA has classified the King Memorial Station as a Neighborhood station. The station is located on Decatur Street, just east of Downtown Atlanta, in the Historic Sweet Auburn Neighborhood. It is bordered to the south by the CSX rail line. The station provides access to the King Memorial, Auburn Avenue, and Historic Oakland Cemetery. The surrounding land use is primarily residential, commercial, and institutional. Just north of the station, 27-acre Auburn Pointe, a mixed-used redevelopment of demolished public housing, is under construction. There are approximately 6,678 people within a half-mile and 76,261 jobs within one mile of the station. MARTA owns a parking lot just south of the station, which is has identified as appropriate for TOD development (Metropolitan Atlanta Regional Tranist Authority 2012).

The urban morphology surrounding the station is a mix of urban static and campus tissues. The street system creates an irregular grid system. Block sizes vary in size throughout the area. The CSX railroad divides the station area, separating the station into two distinct areas. There are several vacant parcels that surround the station that provide TOD opportunities, but large parcelization would require huge infrastructure improvements to create connections into the surrounding area.



This station cannot currently support TODs without a huge commitment to infrastructure improvements. My analysis disagrees with MARTA's findings.

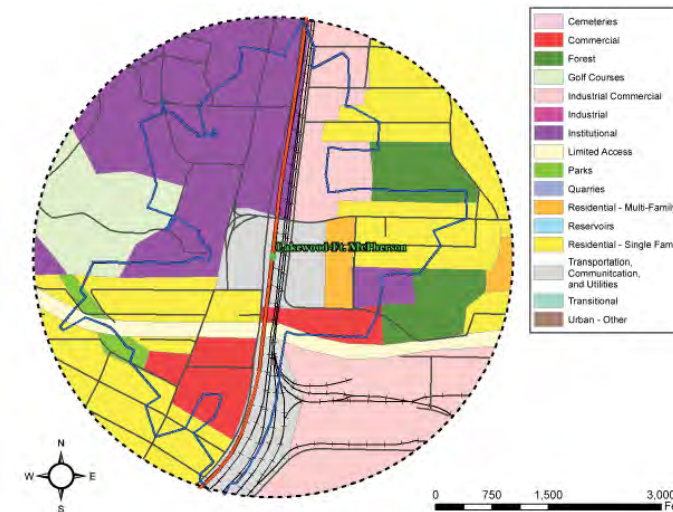
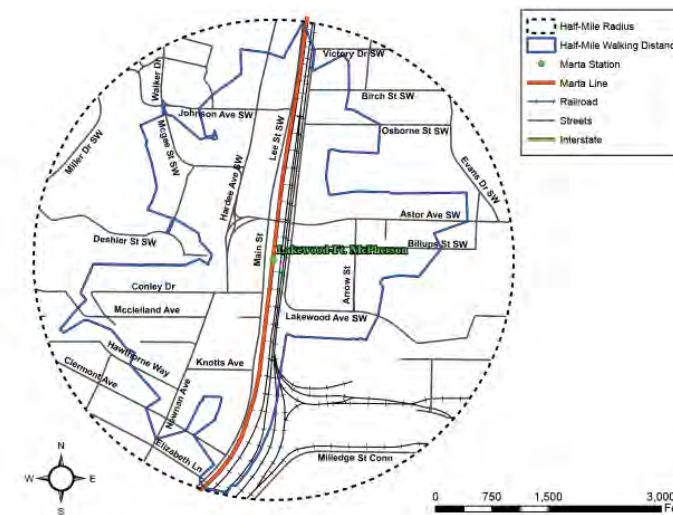
| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 1,941 | - |
| Population | 6,678 | 2,680 |
| Employment | 76,261 | 1,026 |
| Linear Ft. of ROW | - | 45,867 |



LAKEWOOD STATION

site offer opportunities for TOD growth; however, due to limited access into the site, any development would need to develop as a “new town” and establish connections with the surrounding area. Parking lots adjacent to the station offer additional TOD opportunities, but any development would require huge infrastructure improvements.

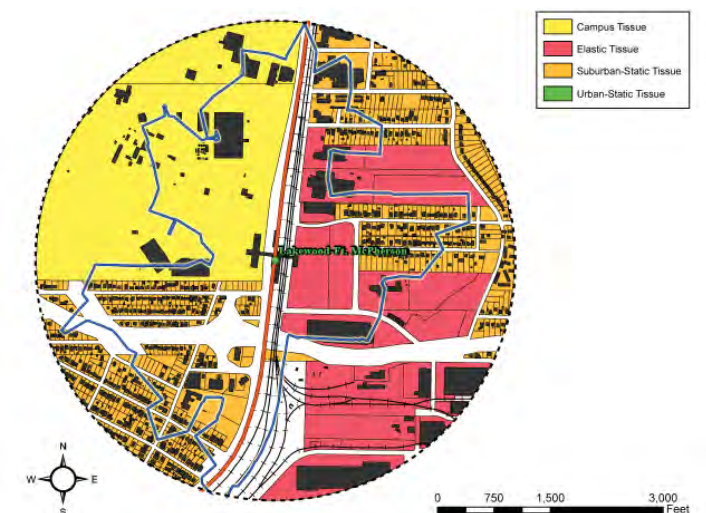
As it currently exists, this station cannot support TODs with major infrastructure improvements. My analysis disagrees with MARTA's findings.



MARTA has classified the Lakewood/Ft. McPherson Station as a Town Center. It is located south of Downtown Atlanta, on the corner of Lee Street and Lakewood Avenue, just east of the former Ft. McPherson site. A mix of residential, institutional, and industrial dominates the surrounding land use. There are approximately 2,176 people within a half-mile and 2,434 jobs within one mile of the station. MARTA owns approximately 8 acres of parking, which straddles both sides of the station. MARTA has identified these areas as appropriate for TOD development (Metropolitan Atlanta Regional Tranist Authority 2012).

The surrounding urban morphology consists of campus, suburban static, and elastic tissues. The street system is a hierarchical structure that is defined by the industrial uses to the east and Ft. McPherson to the west. The CSX railroad divides the service area in half, limiting connections between the halves. The former Ft. McPherson

| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 1,943 | - |
| Population | 2,176 | 1,276 |
| Employment | 2,434 | 694 |
| Linear Ft. of ROW | - | 32,406 |

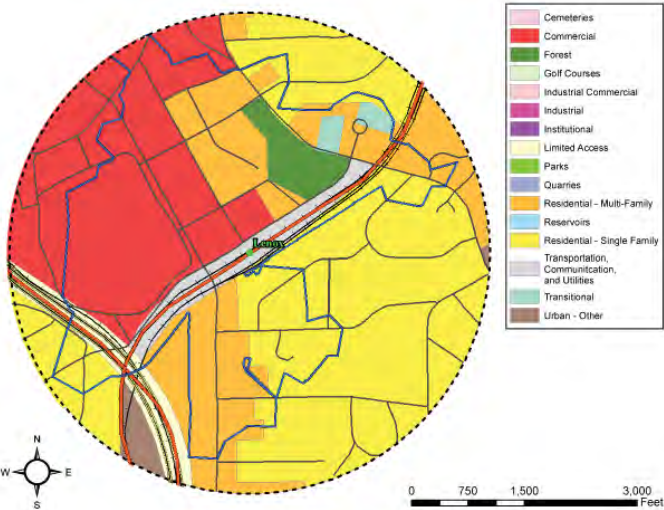
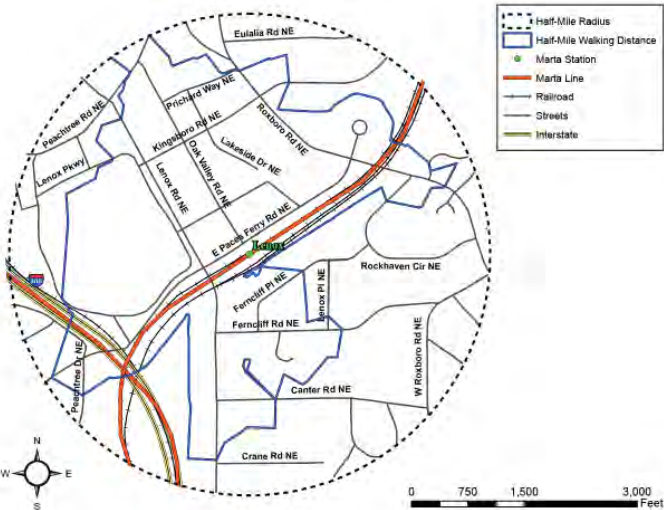


LENOX STATION

MARTA has identified the Lenox Station as an Urban Core station. The station is located on the edge of the Buckhead business district, on the corner East Paces Ferry and Lenox Road. It is adjacent to Lenox Square shopping mall. The surrounding land use is comprised primarily of residential and commercial. Residential areas vary from low-density single family to high-density multi-family homes. There are approximately 4,554 people within a half mile and 37,022 jobs within one mile of the station. MARTA owns about 9 acres of land along the Lenox station, but it is consists of a surface lot, a below grade bus loop and bay, and Resurgens Plaza. Approximately 5 acres have been identified as appropriate for TOD development, but any development would need to occur above the tracks and bus loops, to preserve functionality (Metropolitan Atlanta Regional Tranist Authority 2012).

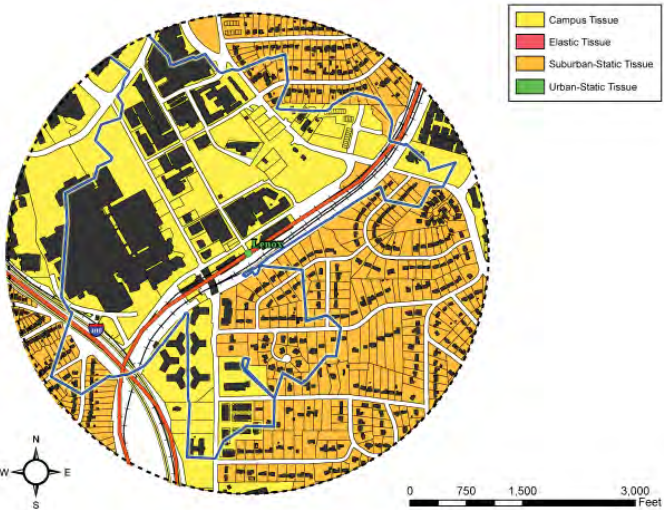
The surrounding urban morphology consists of campus and suburban static tissues. The MARTA line splits the service area and isolates the neighborhood to the south. The area to the north is the only part of the service area that is within walking distance; however, the half of the area is Lenox Square Mall, which is specifically designed for automobile access. A few vacant parcels exist near the station provide TOD opportunities, but the disconnected street system would require huge infrastructure improvements to support TOD

| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 3,466 | - |
| Population | 4,554 | 2,197 |
| Employment | 37,022 | 6,193 |
| Linear Ft. of ROW | - | 28,677 |



growth.

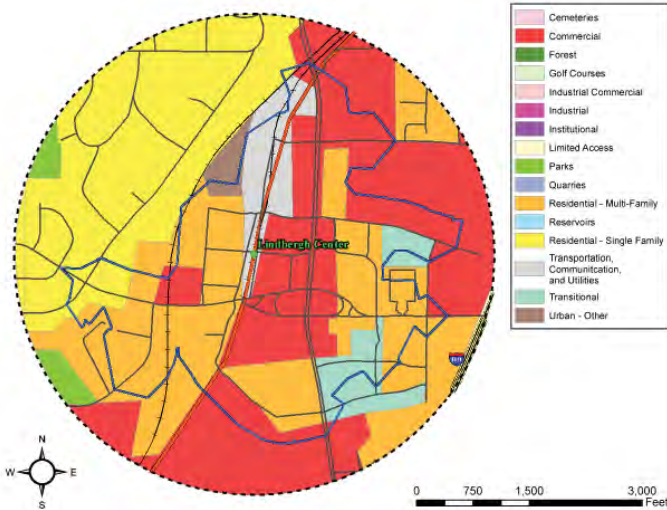
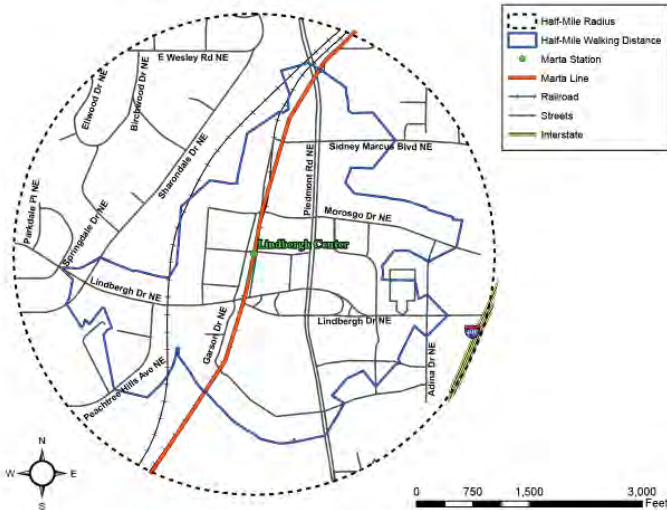
As it currently exists, this station cannot support TODs without major infrastructure improvements. My analysis disagrees with MARTA's findings.



LINDBERGH STATION

urban static, suburban static, elastic, and campus tissues. This station is unique because it is designed as a TOD, but is surrounded by strip development and shopping centers. There are three major arterials, Sydney Marcus Boulevard, Piedmont Road, and Lindbergh Road, which run through the area. This creates unsafe walking conditions around the station and completely isolates it from the surrounding area. As indentified by MARTA, there are several parcels within Lindbergh Center that are prime for TOD growth, but in order to be successful infrastructure improvements must be made that connect into the surrounding areas and create safer walking conditions.

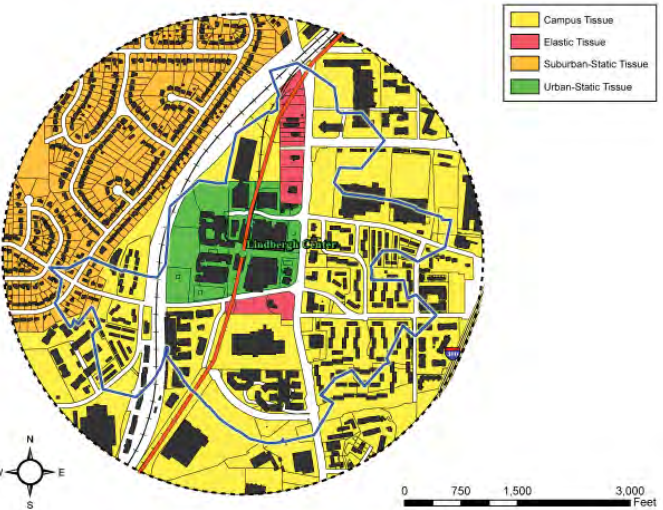
Currently, this station cannot support successful TOD growth without creating major infrastructure connections. My analysis disagrees with MARTA's findings.



MARTA has classified the Lindbergh Station as a Commuter Town Center. It is located north of Midtown Atlanta at the southern edge of the Buckhead shopping and office district, on the corner of Lindbergh and Piedmont Road. The surrounding land use is dominated by residential and commercial. There are approximately 7,640 people within a half-mile and 12,137 jobs within one mile of the station. In 2000, MARTA, collaborated with AT&T to develop the Lindbergh area into an active and mixed-used district. MARTA considers the result, Lindbergh Center, the best example of a successful TOD in Atlanta. In 2008, MARTA conducted a re-visioning process for Lindbergh Center and determined that there are approximately 7 acres of undeveloped or underutilized parcels that are appropriate for TOD expansion within district (Metropolitan Atlanta Regional Tranist Authority 2012).

The surrounding urban morphology consists of

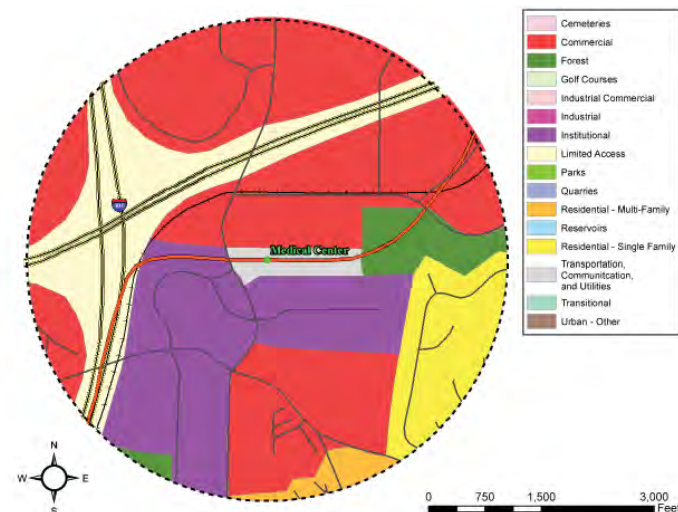
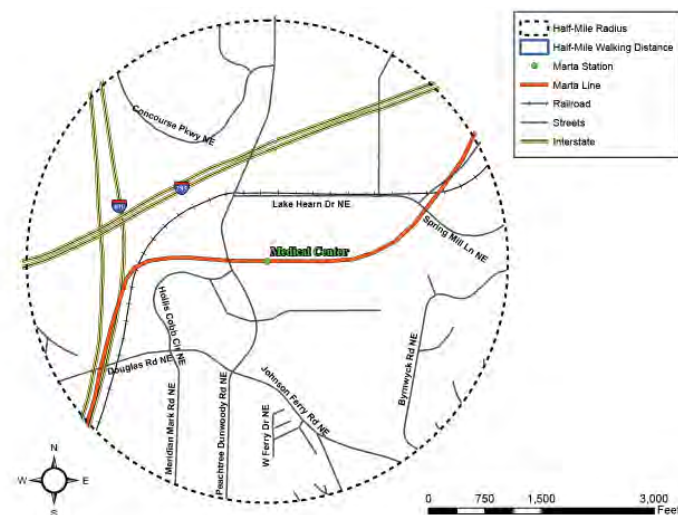
| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 8,981 | - |
| Population | 7,640 | 3,353 |
| Employment | 12,137 | 3,263 |
| Linear Ft. of ROW | - | 34,950 |



MEDICAL CENTER STATION

MARTA classified the Medical Center as a Special Regional Destination station. It is located in the City of Sandy Springs along Peachtree-Dunwoody Road, adjacent to Saint Joseph's Hospital. Northside Hospital and Children's Healthcare of Atlanta are located near the station. The surrounding land use is primarily commercial and institutional, which is made up of primarily medical buildings and office parks. There are approximately 425 people within a half-mile and 40,196 jobs within a mile of the station. The station was included in the ARC LCI as a part of the Perimeter LCI. The study area designated the station area as a high-density mixed-use transit village. MARTA considers the station a TOD because of the existence of the Medical Center Office Tower. MARTA has identified an additional 10 acres around the station, which currently contains a parking lot and bus loop, appropriate for TOD development (Metropolitan Atlanta Regional Transit Authority 2012).

The urban morphology of the surrounding area is composed mostly of campus tissue. The street structure is a hierarchical system. Office complexes surround the station area. These complexes, combined with the street structure make walking to the station nearly impossible, since there are no connections made into the surrounding area, no half-mile walking area exists. MARTA has identified these areas ready for TOD growth, but with the existing morphology unlikely



| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 1,697 | - |
| Population | 425 | - |
| Employment | 40,196 | - |
| Linear Ft. of ROW | - | - |

to change in the near future, TODs around this station would not be successful. The area would need to be developed as a “new town” to create the infrastructure needed to support successful TODs.

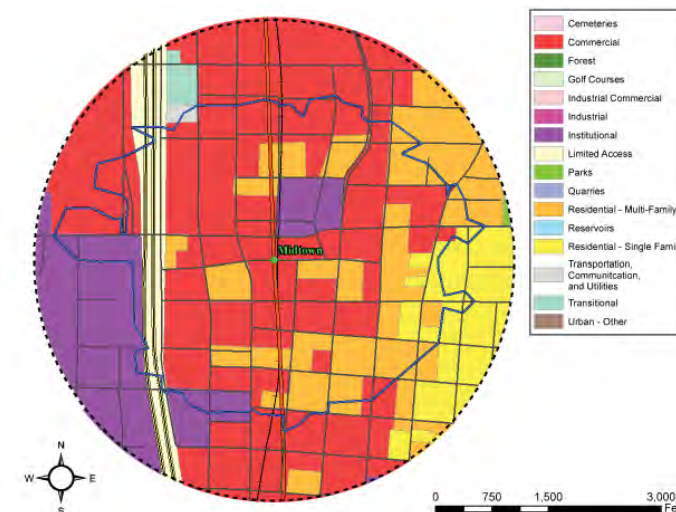
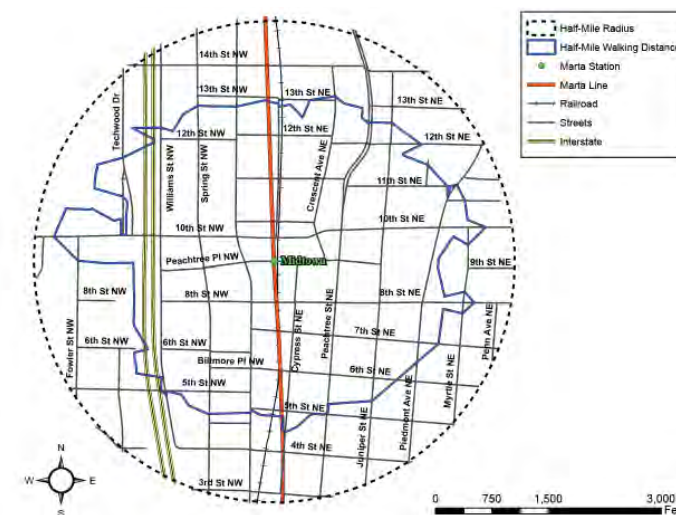
This station cannot currently support TOD development. My analysis disagrees with MARTA's findings.



MIDTOWN STATION

with small blocks. Most of the area has been developed, but there are several underutilized parcels that provide TOD opportunities.

As it currently exists, this station can support TOD growth with little infrastructure improvements. My analysis agrees with MARTA's findings.



MARTA has classified the Midtown Station as an Urban Core station. The station is located north of Downtown Atlanta on the edge of the Midtown business district, at the corner of Peachtree Walk and Cypress Street, south of Tenth Street. The surrounding land use is primarily commercial and residential. Commercial, primarily office buildings and street front retail, makes up about 52% and residential, mostly high-density multi-family buildings, makes up about 29%. MARTA does not own any land surrounding the stations, so it cannot directly develop TODs, but does encourage any adjacent, private development to be transit friendly (Metropolitan Atlanta Regional Transit Authority 2012).

The urban morphology around the station is mostly urban static tissue. This station is located in an urban environment, but is within a half-mile from the North Avenue and Art Center Stations, so its service area is not as large as MARTA suggests. The street system is a gridded system

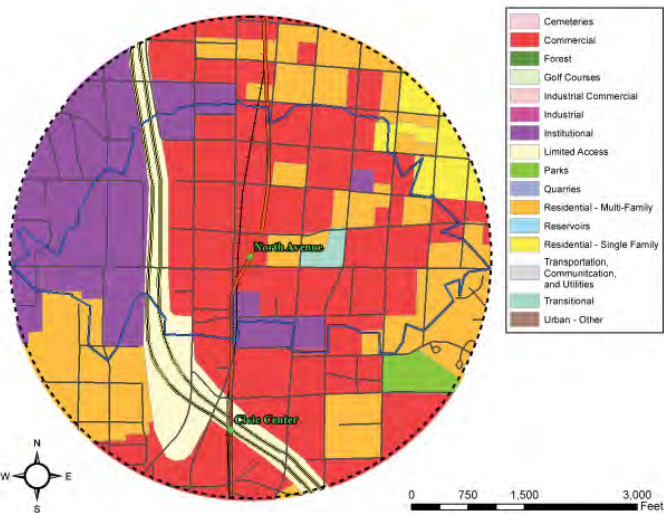
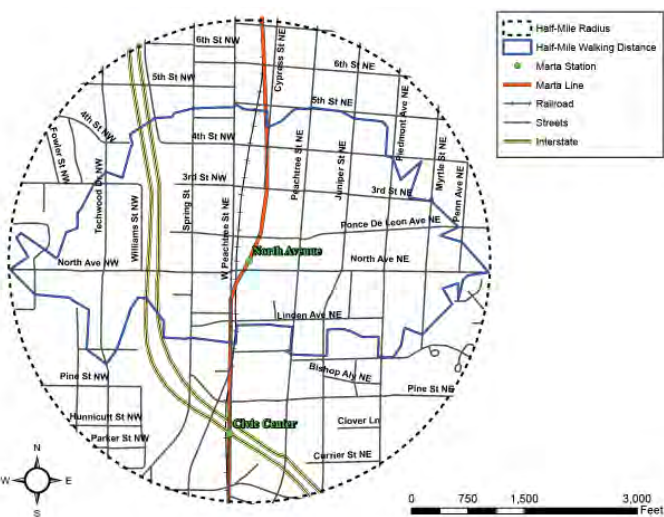
| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 8,849 | - |
| Population | 9,674 | 6,245 |
| Employment | 54,609 | 10,498 |
| Linear Ft. of ROW | - | 50,620 |



NORTH AVENUE STATION

MARTA has indentified the North Avenue Station as an Urban Core station. The station is located north of downtown Atlanta at the corner of North Avenue and West Peachtree Street. It is in an employment rich area, with 73,918 jobs within a one radius of the station. There area has a high residential population with 12,246 residents within a half-radius of the station. The station is located near Georgia Tech and the offices of AT&T. Land use is dominated by commercial and residential uses. Commercial, dominated by office space and supplemental retail, makes up about 42% and residential, ranging from medium to high-density multi-family developments, makes up about 26%. MARTA does not own any land surrounding the stations, so it cannot directly develop the area as TODs, but does encourage any adjacent, private development to be transit friendly (Metropolitan Atlanta Regional Tranist Authority 2012).

The urban morphology of the North Avenue Station is mostly urban static tissue. This station is located in an urban environment, but is within a half-mile from the Midtown and Civic Center Stations, so its service area is not as large as MARTA suggests. Only 17,771 jobs and 12,228 residents are within a half-mile walking distance to the station. The street system is a gridded system with small blocks. Most of the blocks to the east of the station are developed at a high density with a mix of office and residential. Large surface



parking lots and underdeveloped parcels to the west offer TOD opportunities.

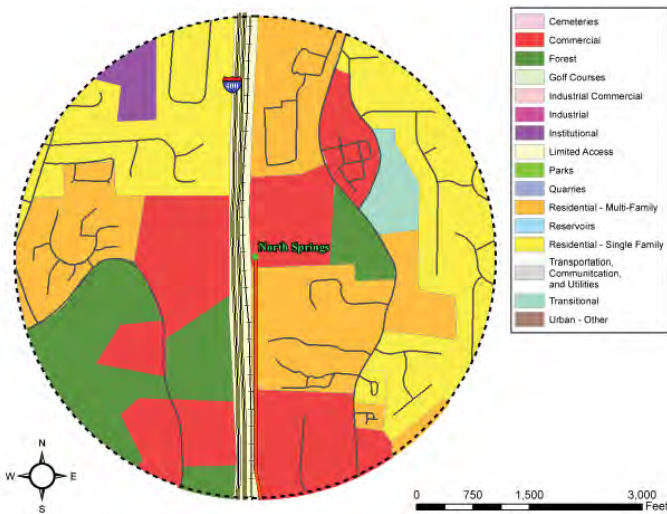
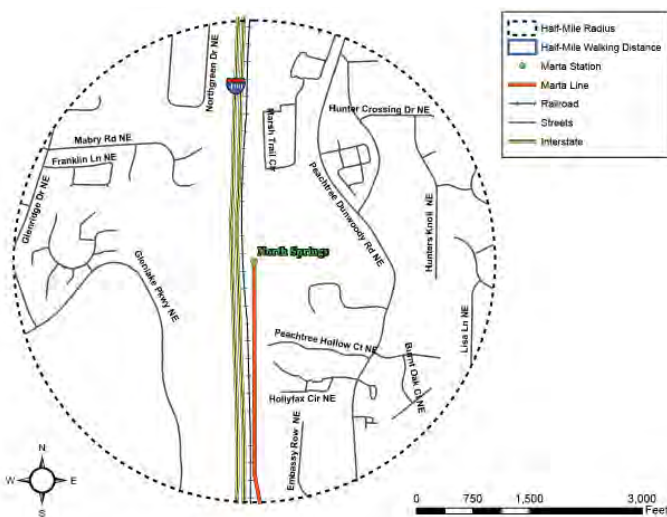
As it currently exists, this station can develop as a TOD with very little infrastructure investment. My analysis agrees with MARTA’s findings.



NORTH SPRINGS STATION

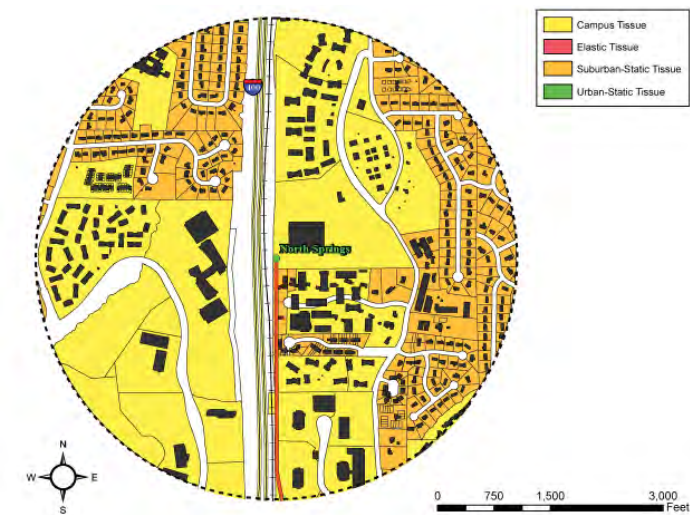
The urban morphology surrounding the station is a mix of campus and suburban static tissues. The station is primarily a park-and-ride station. The existing street structure is a hierarchical system, which does not offer any convenient access to the station. The station is located adjacent to Georgia 400 and large parking garages, which isolate it from the surrounding area. A pedestrian bridge connects to a neighboring apartment complex that only serves the residents, but due to the station’s location there is no public walking access; therefore, no half-mile walking boundary exists. The only safe way to access the station, is by automobile. The station would need to develop as a “new town” to create the infrastructure needed to support TODs.

As it currently exists, this station cannot support TOD development. My analysis disagrees with MARTA’s findings.



MARTA has classified the North Springs station as a Collector station. The station is located between Peachtree Dunwoody Road and Georgia 400. The station is located at the end of the red line and is primarily a park-and-ride station. This is reinforced by dedicated on and off ramps from Georgia 400. The surrounding land use is primarily residential and commercial uses. The residential areas are comprised mostly of single-family and medium density multi-family homes. There are approximately 4,680 people within a half-mile and 22,021 jobs within one mile of the station. Since the station is at the end of the line, MARTA secured enough land to accommodate parking for commuters, but unlike other end of the line stations, the parking is consolidated into two decks, leaving about 13 acres of undeveloped land. MARTA has identified the undeveloped area as appropriate for TOD development (Metropolitan Atlanta Regional Tranist Authority 2012).

| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 6,119 | - |
| Population | 4,680 | - |
| Employment | 22,021 | - |
| Linear Ft. of ROW | - | - |

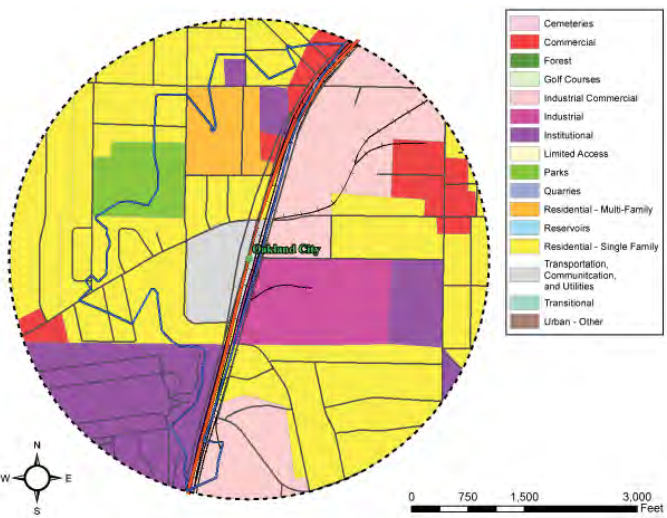
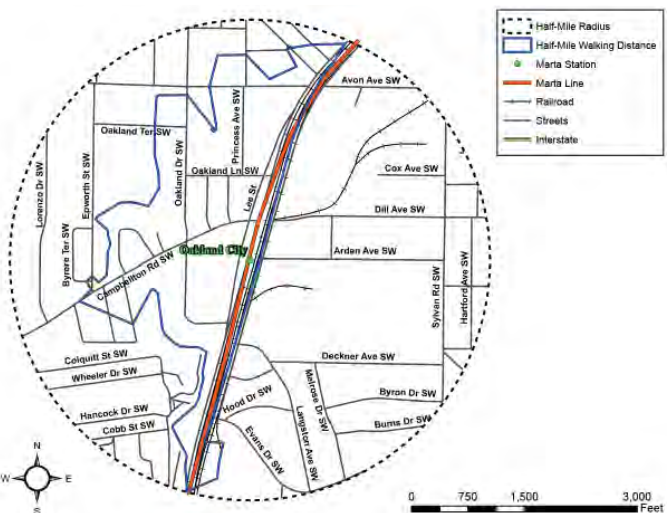
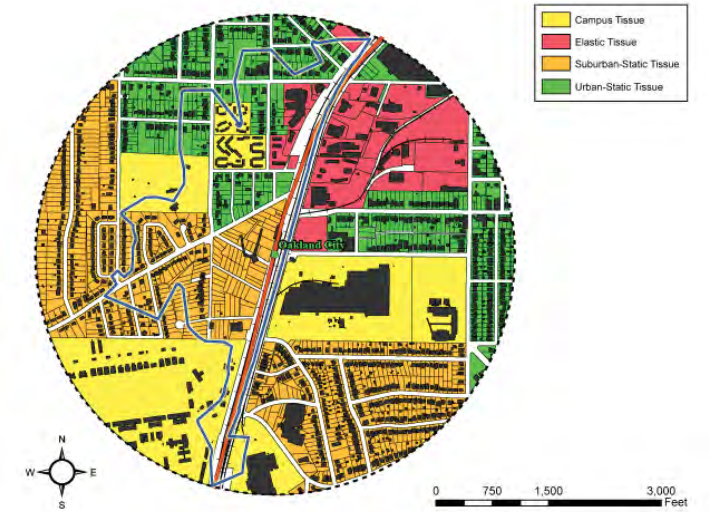


OAKLAND CITY STATION

MARTA has identified the Oakland City Station as a Neighborhood station. The station is located south of Atlanta on the corner of Lee Street and Arden Avenue. The land use is primarily residential and industrial. The residential area is comprised mostly of low to medium density single-family homes. The station is between the Capital View and Oakland City neighborhoods. The industrial areas are mostly light manufacturing users. Approximately 3,297 people within a half-mile and 2,420 jobs within one mile of the station. MARTA currently owns three parking lots next to the station. It has identified about 5 acres of parking as appropriate for TOD development (Metropolitan Atlanta Regional Tranist Authority 2012).

The urban morphology surrounding the station is a mix of suburban static, urban static, elastic, and campus tissues. The CSX railroad line splits the station area in half and completely isolates the eastern half from the station. There is no way to access the station from the east. The western half is the only neighborhood in the area with walking access to the station. The street system has a semi-grid with a mix of small and large blocks. Several apartment complexes in the area create superblocks, which limits the walking connections to the station. The parking lots across from the station offer prime TOD opportunities, but major infrastructure improvements must be made to create

| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 4,718 | - |
| Population | 3,297 | 986 |
| Employment | 2,420 | 85 |
| Linear Ft. of ROW | - | 20,998 |



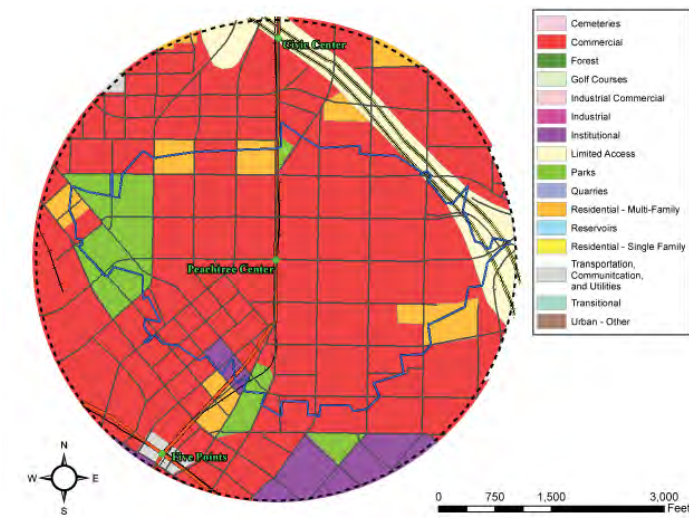
connections into the surrounding neighborhood and across the rail tracks into the eastern part of the area.

This station cannot currently support TOD growth without huge infrastructure improvements. My analysis disagrees with MARTA's findings.

PEACHTREE CENTER STATION

environment, but is within a half mile from the Civic Center and Five Points Stations, so its service area is not as large as MARTA suggests. The street structure is a grid system with small blocks. Most of the blocks within the station are already developed at a high density, so there are few opportunities for TOD growth. However, due to the denseness of the area and existing morphological structure this station could support TODs, when opportunities arise.

As it currently exists, this station can currently support TODs with little infrastructure improvements. My analysis agrees with MARTA's findings.



MARTA has classified the Peachtree Center Station as an Urban Core station. It is located in Downtown Atlanta on Peachtree Street between Harris Street and Andrew Young International Boulevard. It is within the Central Business District. Several attractions are near the station including Centennial Olympic Park, Georgia Aquarium, the World of Coca-Cola, and Woodruff Park. The surrounding land use is primarily commercial areas that are dominated by high-rise office buildings, street level retail, and mixed-use buildings. The area has approximately 3,511 people within a half-mile and 120,058 jobs within one mile of the station. MARTA does not own any land surrounding the stations, so it cannot directly develop the area as TODs, but does encourage any adjacent, private development to be transit friendly (Metropolitan Atlanta Regional Tranist Authority 2012).

The urban morphology surrounding the station is mostly urban static tissue. This station is located in an urban

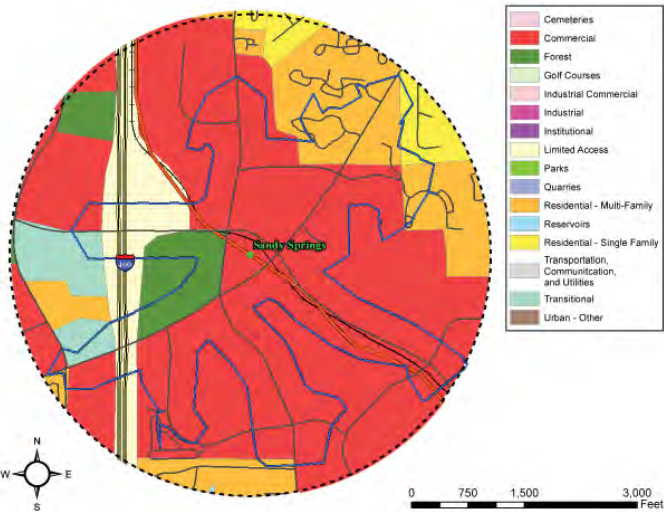
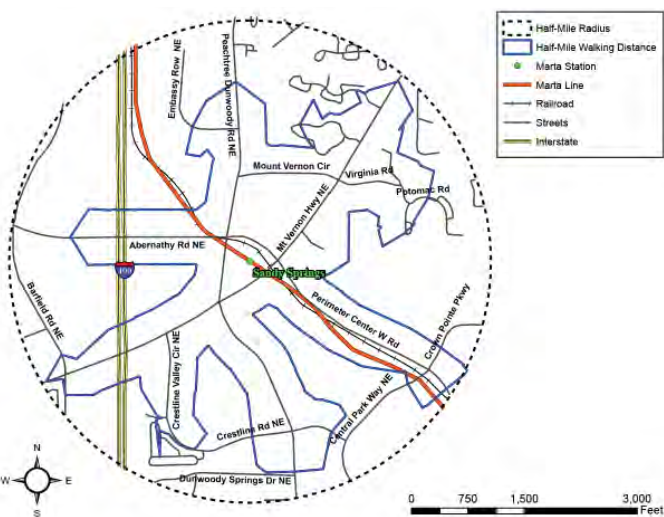
| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 7,633 | - |
| Population | 3,511 | 3,187 |
| Employment | 120,058 | 27,455 |
| Linear Ft. of ROW | - | 47,060 |



SANDY SPRINGS STATION

MARTA has identified the Sandy Springs Station as a Commuter Town Center. The station is located in the City of Sandy Springs on the corner of Abernathy Road and Mt. Vernon Highway. Commercial areas, which are comprised mostly of Class A office towers, Perimeter Pointe shopping center, and Perimeter Square Mall, makes up about 62% of the surrounding land use. The only residential areas consist of medium to high-density multi-family developments. There are approximately 1,720 people within a half-mile and 32, 921 jobs within one mile of the station. MARTA does not own any land surrounding the stations, so it cannot directly develop the area as TODs. There are several undeveloped private parcels adjacent to the station ideal for development. MARTA encourages any development to be transit friendly (Metropolitan Atlanta Regional Tranist Authority 2012).

The urban morphology around the station is dominated by campus tissue. The street system is a hierarchical system of streets that services office complexes and shopping malls. The roads that surround the station are big arterial roads that have at least four lanes of traffic. Combined with the parking lots that service the surrounding uses, the area is designed primarily for cars. Two vacant parcels immediately adjacent to the station offer prime TOD opportunities, but any development would require major infrastructure improvements. Major redevelopment of the



| | Marta's Figures Within Walking Distance | |
|-------------------|---|--------|
| Daily Ridership | 2,356 | - |
| Population | 1,720 | 936 |
| Employment | 32,921 | 3,707 |
| Linear Ft. of ROW | - | 24,130 |

surrounding shopping centers into transit and pedestrian friendly districts, would increase the success rate for TODs in the area.

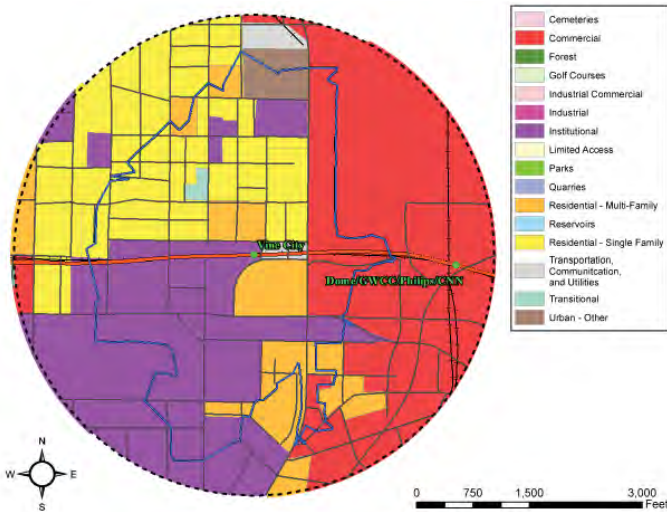
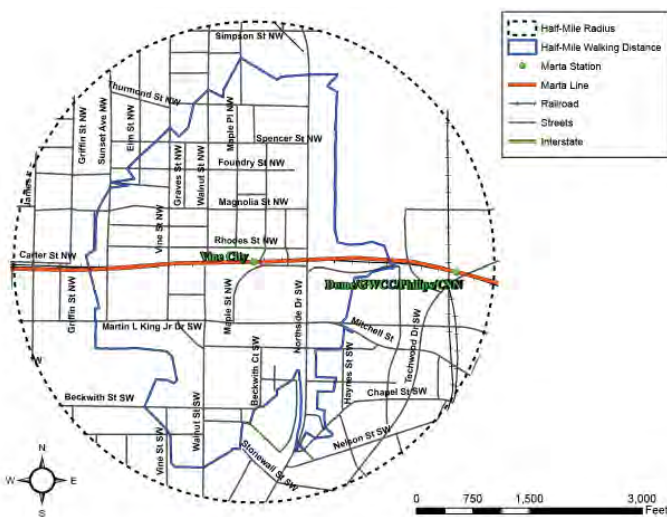
As it currently exists, this station cannot develop as a TOD without major infrastructure improvements. My analysis disagrees with MARTA's findings.



VINE CITY STATION

is a mix of elastic, urban static, and campus tissues. The street structure consists of a grid system with small blocks. Northside Drive bounds the station to the east and acts as barrier between the neighborhood and the Georgia Dome\ Congress Center. This is beneficial for the neighborhood, because it defines the area and separates competing uses. Several vacant lots around the station are currently being used as parking for the Dome. These underutilized parcels offer prime opportunities for TOD growth in the area.

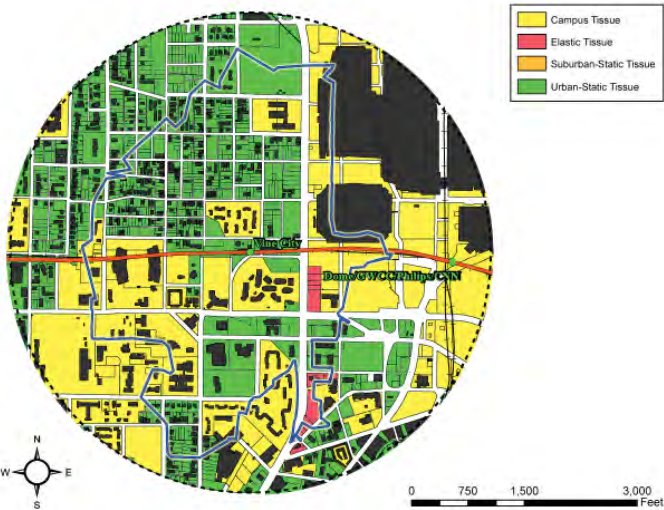
As it currently exists, this station can support TOD growth with little infrastructure improvements. My analysis agrees with MARTA's findings.



MARTA has identified the Vine City Station as a Neighborhood station. It is located west of Downtown Atlanta in the Vine City neighborhood. The station is between Electric Avenue, Rhodes Street, and Northside Drive, directly across from the Georgia Dome. The surrounding land use is an almost equal mix of commercial, residential, and institutional areas. The Georgia Dome and associated parking lots take up most of the commercial areas and the Georgia World Congress Center occupies the majority of the institutional area. The residential area is mostly medium density single family and multi-family homes. There are approximately 5,096 people within a half-mile and 74,275 jobs within one mile of the station. MARTA does not own any land surrounding the station, but does own the air rights making TOD development possible, but very limited (Metropolitan Atlanta Regional Tranist Authority 2012).

The urban morphology surrounding the station

| | Marta's Figures Within Walking Distance | |
|-------------------|---|--------|
| Daily Ridership | 1,696 | - |
| Population | 5,096 | 1,986 |
| Employment | 74,275 | 696 |
| Linear Ft. of ROW | - | 40,990 |

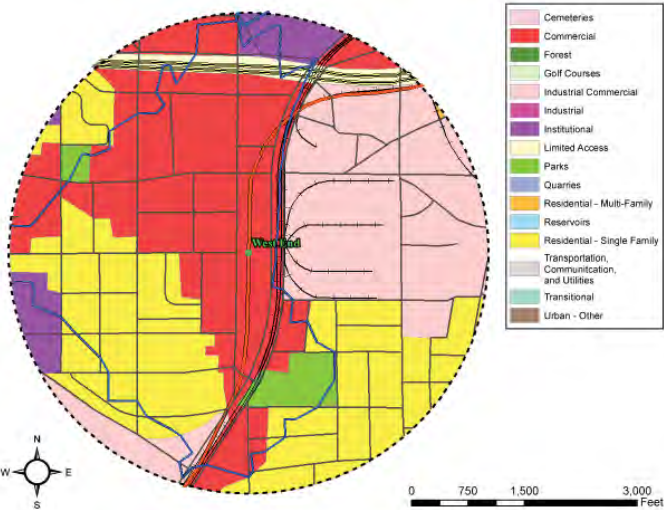
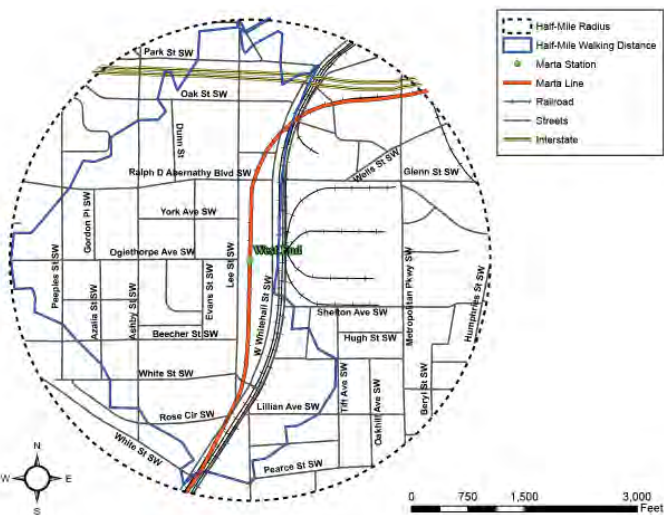


WEST END STATION

MARTA has classified the West End Station as a Neighborhood station. It is located south of Downtown Atlanta on the corner of Lee Street and Oglethorpe Avenue in the West End neighborhood. The surrounding land use is primarily residential, commercial, and industrial areas. There are approximately 3,001 people within a half-mile and 6,244 jobs within one mile of the station. The neighborhood was the focus of an ARC LCI study, which was initiated to create strategies that strengthen the historic district, redevelop underutilized parcels, and enhance connections to the station. Several projects have already taken place, which have converted old industrial buildings into studio lofts and apartments. MARTA has identified about 11 acres available for continued redevelopment of the area. However, there are limited conventional possibilities due to the elevated train platform that dissects the station area (Metropolitan Atlanta Regional Tranist Authority 2012).

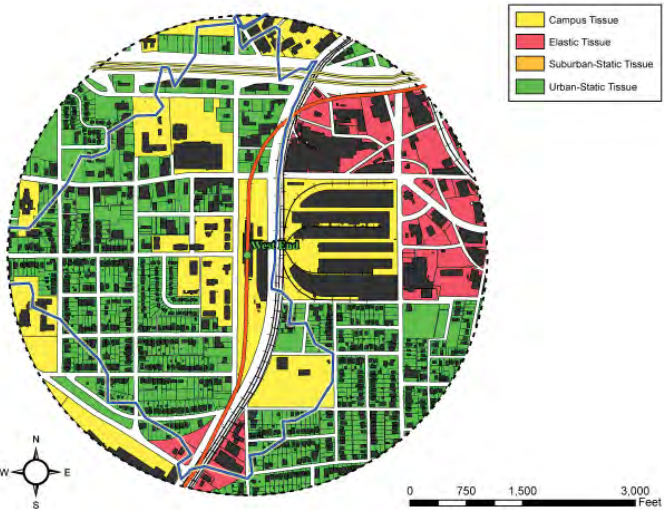
The surrounding urban morphology is a mix of campus, elastic, and urban static tissue. The CSX railroad line runs to the east of the station, isolating the majority of the eastern neighborhood from the station. The surrounding street structure is a gridded system with small blocks; however, several commercial uses in the area have created superblocks, which destroy the character of the small blocks. The elevated MARTA track limits development immediately

| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 6,923 | - |
| Population | 3,001 | 1,658 |
| Employment | 6,244 | 806 |
| Linear Ft. of ROW | - | 39,764 |



adjacent to the station, but the large commercial parcels offer redevelopment opportunities nearby. Any development in those areas must make infrastructure improvements to in order to restore connections within the area.

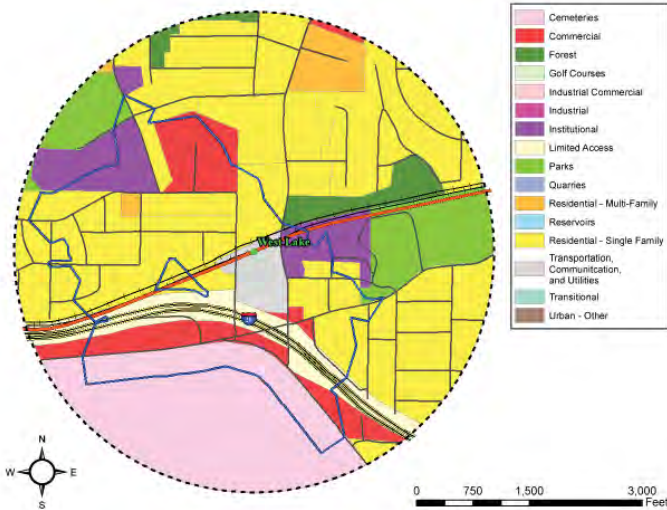
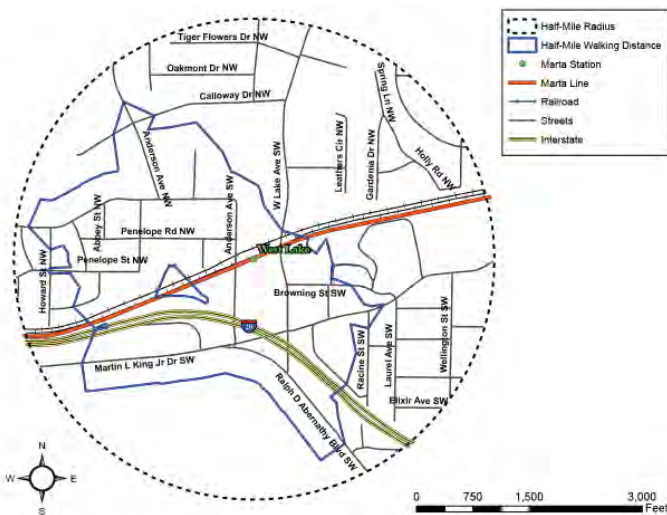
This station cannot currently support TOD growth without huge infrastructure improvements. My analysis disagrees with MARTA's findings.



WEST LAKE STATION

This increases automobile traffic around the station, making it unsafe for pedestrian access. The only safe way to access the station is by car. The large parking lots adjacent to the station provide TOD opportunities, but any development would require major infrastructure improvements.

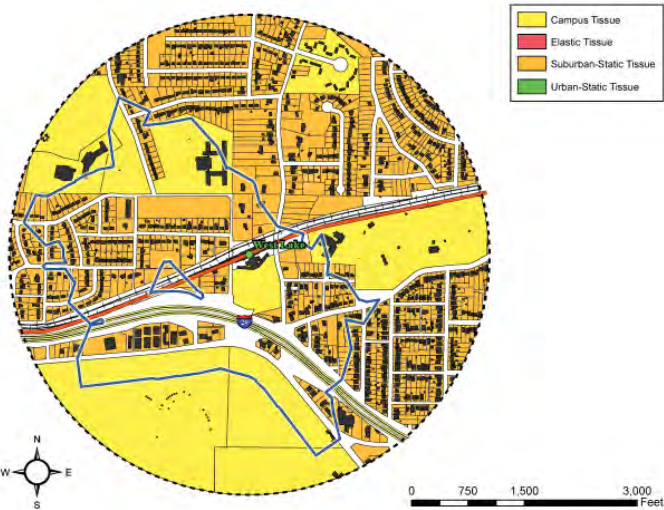
This station cannot currently support TOD development, without a huge investment in infrastructure improvements. My analysis disagrees with MARTA's findings.



MARTA has identified the West Lake Station as a Neighborhood station. The station is located west of Downtown Atlanta at the intersection of Interstate 20 and Anderson Avenue. The surrounding land use is comprised primarily of residential, park, and cemetery uses. The residential areas are comprised almost entirely of low-density single-family homes. There are approximately 3,317 people within a half-mile and 1,151 jobs within one mile of the station. MARTA owns four parking lots, approximately four acres, south of the station, which it has recognized as appropriate for TOD development (Metropolitan Atlanta Regional Tranist Authority 2012).

The surrounding urban morphology is a combination of campus and suburban static tissue. The street structure is a hierarchical system that has very little connections between roads. Interstate 20 borders the station area to the south and the exits ramps end at the entrance to the station.

| | Marta's Figures | Within Walking Distance |
|-------------------|-----------------|-------------------------|
| Daily Ridership | 2,417 | - |
| Population | 3,317 | 1,102 |
| Employment | 1,151 | 132 |
| Linear Ft. of ROW | - | 21,860 |



CONCLUSION

The creation of successful TODs requires the convergence of many complex factors, such as social conditions, demographics, economic conditions, political support, community support, promotion of alternative transportation, plus many more. However, these factors become irrelevant if the proper foundation to build upon does not exist. A functioning urban structure/urban design provides the proper framework for TODs. It provides the framework for a walkable, transit friendly community to develop. When identifying TOD suitability around existing transit stations, identification of the urban fabric should always be the first step in the analysis.

I believe there are three key flaws in MARTA's analysis. First, MARTA fails to take into account the existing urban morphology, the combination of lots, blocks, and streets. Second, MARTA uses a half-mile radius to determine population and a one-mile half-mile radius to determine employment. These buffers produce misleading figures because they fail to take into account walking distance. The distance an average person is willing to walk, before another mode of transit is considered, is a half-mile, or a ten-minute walk (Calthorpe 1993). If a person is within a half-mile radius of a station, it does not guarantee they will be within walking distance. Existing urban morphology and street structure may hinder or prohibit access. Therefore, that person is highly unlikely to walk to the station, opting instead to use a car or another form of transportation. The primary goal of TODs is to promote walkability; therefore, a half-mile walking distance should be used. Lastly, MARTA's conclusions are based primarily on zoning and do not take into account urban morphology. This is misleading because even if a station is favorably zoned, the area may lack the proper urban infrastructure, such as streets and sidewalks needed to support successful TOD development.

My analysis only attempts to identify the existing urban fabric to determine whether a proper TOD foundation exists around each station. It does not guarantee success, only ensures that the proper foundation is in place. My suitability conclusions are based solely on urban morphological fabric and the amount of urban infrastructure improvements that would be needed to support TODs. The research is meant to provide MARTA with the knowledge that urban design is the primary indicator of TOD suitability and is equally important, if not more, than zoning. These results provide the proper foundation upon which all other factors should build to create successful, community-oriented TODs.

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